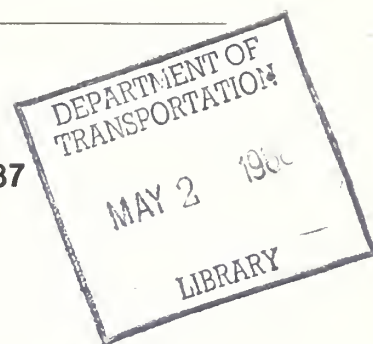


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1987

Department  
of Transportation  
Federal Highway  
Administration

DOT HS 807 241  
Test Report

October 1987



# Vehicle Barrier Impact Testing on a 1987 Subaru XT 2-Door Coupe with Hybrid III Dummies

The United States Government does not endorse products or manufacturers. Trade or manufacturers' names appear only because they are considered essential to the object of this report.

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16. Abstract  A 30 mph flat frontal barrier impact test was conducted on a 1987 Subaru XT 2-door coupe at the Transportation Research Center of Ohio on October 13, 1987, using Hybrid III driver and passenger dummies.  The barrier impact velocity was 29.5 mph.  The ambient temperature was 69°F. <div data-bbox="1047 1092 1429 1449" data-label="Image"> </div>		
17. Key Words Occupant Response Hybrid III Dummy	18. Distribution Statement Available from: National Technical Information Service Springfield, Virginia 22161	
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SECTION 1.0  
PURPOSE AND INTRODUCTION

## PURPOSE

This 30 mph frontal barrier impact test is part of a program to document the response of Hybrid III occupant dummies conducted for the National Highway Traffic Safety Administration (NHTSA) by the Transportation Research Center of Ohio (TRC) under Contract No. DTNH22-85-C-08123. The purpose of this test was to determine Hybrid III dummy response in the subject vehicle, a 1987 Subaru XT 2-door coupe. The test was conducted in accordance with the FMVSS 208 portions of the Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure No. TP-208-06 dated May 15, 1987, except for the use of Hybrid III dummies in place of Part 572 B dummies.

## TEST SUMMARY

The 1987 Subaru XT 2-door coupe was equipped with a 1.6 liter transverse engine, manual transmission, and power brakes. The test weight of the vehicle was 2762 pounds. The Head Injury Criteria (HIC) calculation of the driver dummy was less than 1000, but the passenger dummy's HIC calculation was greater than 1000. The resultant accelerations of the thorax did not exceed 60 g's, and the compressive forces transmitted through the upper legs did not exceed 2,250 pounds as measured by Hybrid III dummies seated in the driver's and right front passenger's seats.

Two Hybrid III, 50th percentile, adult male anthropomorphic test devices (ATDs) were seated in the front outboard designated seating positions. The dummies were positioned according to the dummy placement procedures specified in FMVSS 208 Notice 45.

Both ATDs were instrumented with head and chest triaxial accelerometers oriented to measure accelerations in the longitudinal, lateral, and vertical directions, a chest displacement potentiometer, right and left femur load cells, and neck load cells oriented to measure longitudinal and vertical forces and moment about the lateral axis.

The vehicle was instrumented with seven longitudinal axis accelerometers. Seat belt load cells were installed on each occupant's passive seatbelt.

The crash event was recorded by one (1) real time panning camera and fourteen (14) high speed motion picture cameras operating at approximately 500 frames per second.

The thirty-three (33) channels of data were multiplexed and recorded on a 14-track tape drive. The data was digitally sampled at 8000 samples per second digitally processed per sections 12.8 and 12.9 of the laboratory procedure.

The vehicle was impacted into the rigid, flat frontal barrier at the Transportation Research Center of Ohio on October 13, 1987. The test vehicle's impact speed was 29.5 mph. The vehicle sustained 20.8 inches of static crush.

The camera information is presented in Section 3.0. Appendix A contains the still photographic prints. Appendix B contains the vehicle and dummy data plots. Appendix C contains the post-test dummy performance calibrations.

# CRASH TEST SUMMARY

TEST NO.: 871013

DATE: October 13, 1987

TIME: 1321

TEMP: 69°F

VEHICLE: 1987 Subaru XT 2-door coupe

TEST WEIGHT (LBS): 2762

IMPACT ANGLE (DEG)\*: 0

IMPACT VELOCITY (MPH)\*\*: PRIMARY = 29.5

SECONDARY = 29.5

MAX CRUSH (IN) STATIC: 20.8

REBOUND (IN): 13.1

DUMMIES: Driver

Passenger

TYPE: Hybrid III

Hybrid III

LOCATION: Front Left

Front Right

RESTRAINT: Two-point passive belt

Two-point passive belt

NUMBER OF DATA CHANNELS: 33

NUMBER OF HIGH SPEED CAMERAS: 14 and 1 real-time camera

\*With respect to tow track centerline.

\*\*Speed trap measurement ( $\pm .05$ mph accuracy).

TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Fuji Heavy Ind. LTD Japan

MAKE/MODEL: Subaru DL XT coupe

VIN: JF1AX4224HB317081

BODY STYLE: 2-door sport coupe

MODEL YEAR: 1987

COLOR: White

ENGINE DATA: TYPE: Transverse CYLINDERS: 4 DISPLACEMENT: 1800cc

X Gas,        DIESEL,        TURBOCHARGE

TRANSMISSION DATA: 5 SPEED, X MANUAL,        AUTOMATIC, X FWD RWD

DATA VEHICLE RECEIVED: 10/05/87

ODOMETER READING: 634

DEALER'S NAME AND ADDRESS: NA

ACCESSORIES:

POWER STEERING No

POWER BRAKES Yes

POWER SEATS Yes

POWER WINDOWS No

TINTED GLASS Yes

RADIO Yes

CLOCK Yes

OTHER None

AUTOMATIC TRANSMISSION No

AUTOMATIC SPEED CONTROL No

TILTING STEERING WHEEL Yes

TELESCOPING STEERING WHEEL Yes

AIR CONDITIONING No

ANTI-SKID BRAKE No

REAR WINDOW DEFROSTER Yes

DATA FROM CERTIFICATION LABEL ON LEFT DOOR FACE OR "B" POST:

VEHICLE MANUFACTURED BY: Fuji Heavy Ind. LTD Japan

DATE OF MANUFACTURER: 6/87

GVWR: 3090 LBS.

GAWR: FRONT 1630 LBS., REAR 1460 LBS.



DATA FROM "RECOMMENDED TIRE PRESSURE" LABEL ON DOOR, POST, GLOVEBOX, ETC.

VEHICLE LOAD (UP TO CAPACITY): FRONT 28 psi; REAR 28 psi

RECOMMENDED TIRE SIZE: 165/SR13 LOAD RANGE X B, C, D

TIRES ON VEHICLE (MFG. & LINE, SIZE): Bridgestone SF-405 Steel 195SR13

IS SPARE TIRE "SPACE SAVER"? Yes

IS SPARE TIRE STANDARD EQUIPMENT? No

VEHICLE CAPACITY: TYPES OF SEATS: Front bucket

TYPE OF FRONT SEAT BACKS Adjustable

NUMBER OF OCCUPANTS 2 FRONT 2 REAR 4 TOTAL

CARGO LOAD 60 LBS. TOTAL 660 LBS.

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (WITH MAXIMUM FLUIDS):

RIGHT FRONT 686 lbs. RIGHT REAR 487 lbs.

LEFT FRONT 717 lbs. LEFT REAR 488 lbs.

TOTAL FRONT WEIGHT 1,403 lbs. (59.0% OF TOTAL VEHICLE WEIGHT)

TOTAL REAR WEIGHT 975 lbs. (41.0% OF TOTAL VEHICLE WEIGHT)

TOTAL DELIVERED WEIGHT 2,378 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

RCLW + RATED CARGO AND LUGGAGE WEIGHT

UDW = UNLOADED DELIVERED WEIGHT (2378 LBS)

VCW = VEHICLE CAPACITY WEIGHT (660 LBS)

DSC = DESIGNATED SEATING CAPACITY (4)

RCLW = VCW - (150) (DCS) = (60 LBS)

TARGET TEST WEIGHT = UDW + RCLW + (2 DUMMIES X 167 LBS/DUMMY)

= 2378 + 60 + 334 LBS

TARGET TEST WEIGHT = 2772 LBS

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 50 LBS. CARGO:

RIGHT FRONT        745 lbs.                      RIGHT REAR        615 lbs.

LEFT FRONT        786 lbs.                      LEFT REAR        606 lbs.

TOTAL FRONT WEIGHT    1,531 lbs.    (55.4% OF TOTAL VEHICLE WEIGHT)

TOTAL REAR WEIGHT    1,231 lbs.    (44.6% OF TOTAL VEHICLE WEIGHT)

TOTAL TEST WEIGHT    2,762 lbs.    ( 0.4% UNDER TARGET WEIGHT)

WEIGHT OF BALLAST SECURED IN VEHICLE TRUNK AREA:    0 lbs.

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES): NONE

DELIVERED ATTITUDE:    LF   25.7;        RF   25.8;        LR   23.3;        RR   23.6

PRE-TEST ATTITUDE:    LF   25.6;        RF   25.6;        LR   22.9;        RR   23.0

POST-TEST ATTITUDE:    LF   30.6;        RF   27.2;        LR   22.7;        RR   21.6

WHEELBASE:    97.2 INCHES

MAX. WIDTH:    66.8 INCHES

CG = 43.3        INCHES REARWARD OF FRONT WHEEL CENTERLINE

TEST CONDITIONS

TEST NUMBER:    871013

DATE OF TEST:    10/13/87

TIME OF TEST:    1321

TYPE OF TEST:    Frontal Barrier Impact

IMPACT ANGLE:    0°

AMBIENT TEMPERATURE AT IMPACT AREA:

69°F

TEMPERATURE IN OCCUPANT COMPARTMENT:

69°F

IMPACT VELOCITY:    PRIMARY =    29.5 MPH

SECONDARY =    29.5 MPH

(SPECIFIED RANGE = 28.9 to 29.9 MPH)

VEHICLE REBOUND AND CRUSH (ALL DIMENSIONS IN INCHES)

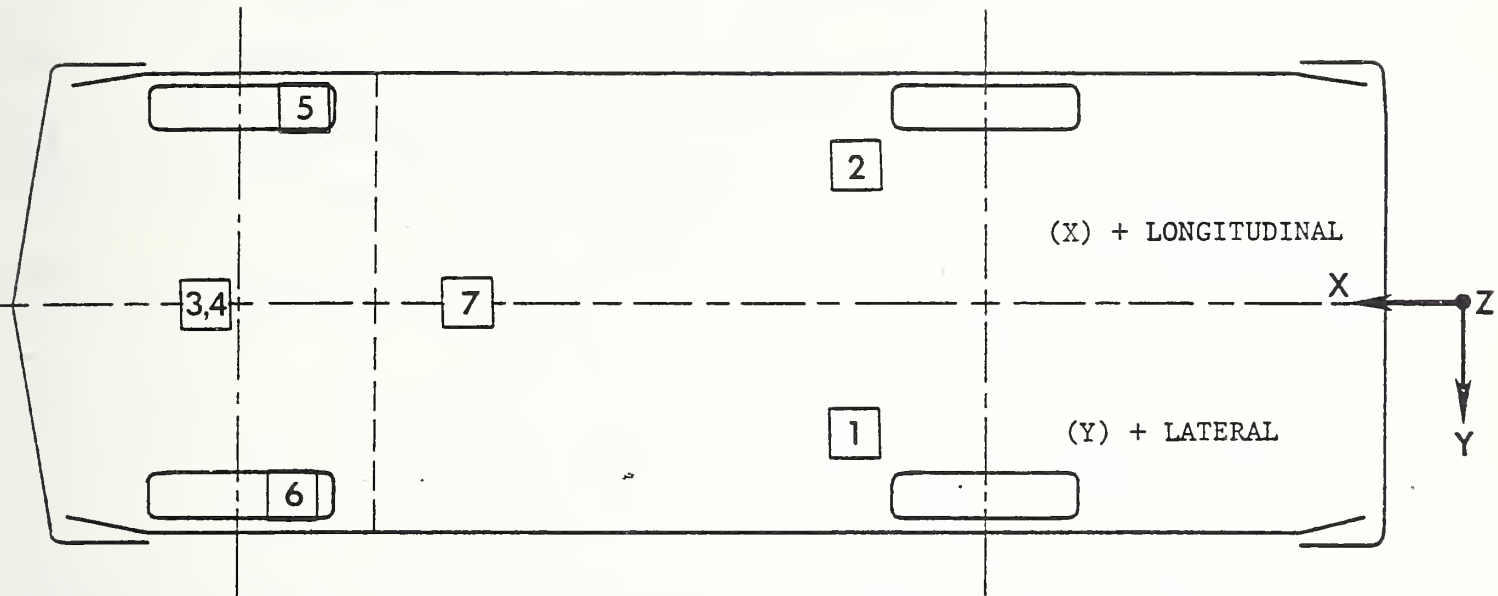
OVERALL LENGTH OF TEST VEHICLE:    PRE-TEST:    L 174.9        ;C 177.5        ;R 175.0

   POST-TEST:    L 157.0        ;C 157.9        ;R 155.9

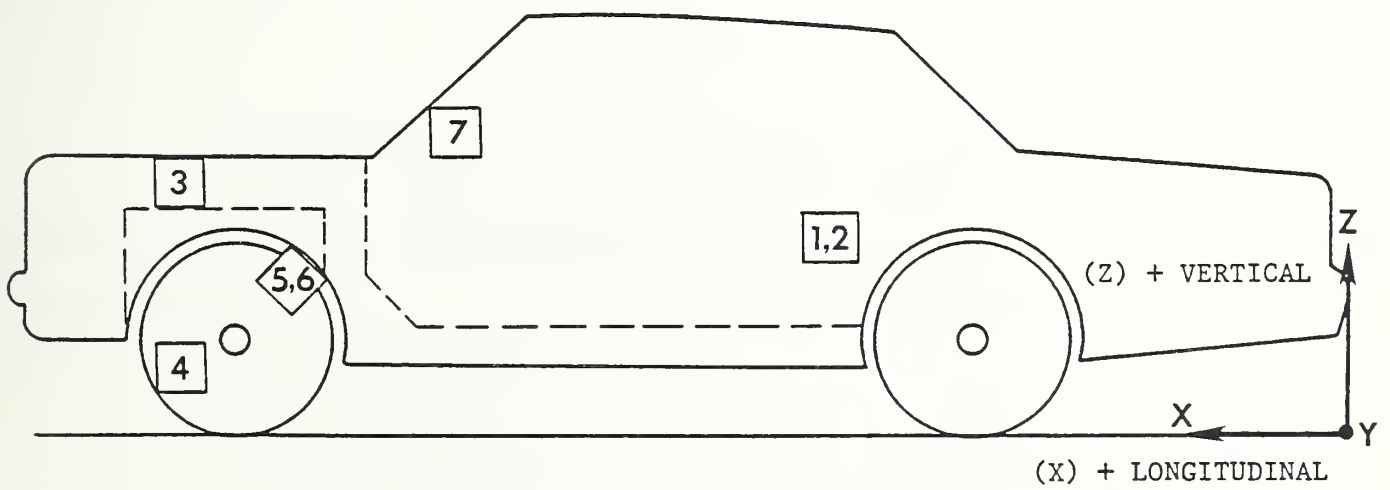
   TOTAL CRUSH:    L 17.9        ;C 19.6        ;R 19.1

FOR FRONTAL IMPACT, DISTANCE FROM FRONT OF TEST VEHICLE TO BARRIER AFTER  
IMPACT:    L: 13.6                      ;C: 12.2                      ;R: 13.4                      :AVG: 13.1

# VEHICLE ACCELEROMETER LOCATIONS



TOP VIEW



SIDE VIEW

TEST NUMBER 871013

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

No.	LOCATION		X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
						MAX G	MSEC	MAX G	MSEC
1	REAR SEAT CROSSMEMBER	PRE	65.5	17.8	13.1				
	AT LEFT SIDE	POST	65.5	17.8	13.2				
	LONGITUDINAL					2.4	14.0	30.2	53.6
2	REAR SEAT CROSSMEMBER	PRE	65.5	-17.5	13.0				
	AT RIGHT SIDE	POST	65.5	-17.5	13.1				
	LONGITUDINAL					3.2	14.3	29.5	53.6
3	TOP OF ENGINE BLOCK	PRE	150.5	3.7	21.5				
		POST	150.0	3.8	21.6				
	LONGITUDINAL					29.2	49.9	128.3	40.1
4	BOTTOM OF ENGINE	PRE	149.0	0.0	7.8				
		POST	144.5	0.0	9.0				
	LONGITUDINAL					31.1	49.9	106.1	39.6
5	BRAKE CALIPER	PRE	131.6	-23.9	7.7				
	AT RIGHT SIDE	POST	131.6	-23.9	6.1				
	LONGITUDINAL					15.3	88.0	53.9	46.9
6	BRAKE CALIPER	PRE	131.8	23.9	7.5				
	AT LEFT SIDE	POST	131.4	23.9	6.5				
	LONGITUDINAL					7.9	51.8	48.0	58.4
7	DASH PANEL	PRE	109.8	0.0	35.0				
		POST	109.9	0.0	35.1				
	LONGITUDINAL					16.9	75.3	39.9	86.4

\* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

REFERENCE: X: FORWARD FROM REAR BUMPER  
Y: LEFT FROM VEHICLE CENTERLINE  
Z: UPWARD FROM GROUND LEVEL

# ACCIDENT INVESTIGATION DIVISION DATA

## FOR 30 MPH FRONTAL BARRIER IMPACT

VEHICLE MAKE/MODEL/BODY STYLE: Subaru XT 2-door coupe

VEH. NHTSA NO.: \_\_\_\_\_; VIN: JF1AX4224HB317081

MODEL YEAR: 1987; BUILD DATE: 6/87; TEST DATE 10/13/87

VEH. SIZE CATEGORY: Two-seater; TEST WEIGHT: 2762 lbs.

VEH. WHEELBASE: 97.2 VEH. MAXIMUM WIDTH: 66.8 FRONTAL OVERHANG: 39.1

COLLISION DEFORMATION CLASSIFICATION (CDC) CODE: 12FDEW3

### F (Frontal)

CRUSH DEPTH  
DIMENSIONS:

C1 = 17.9 inches

C2 = 19.4 inches

C3 = 20.8 inches

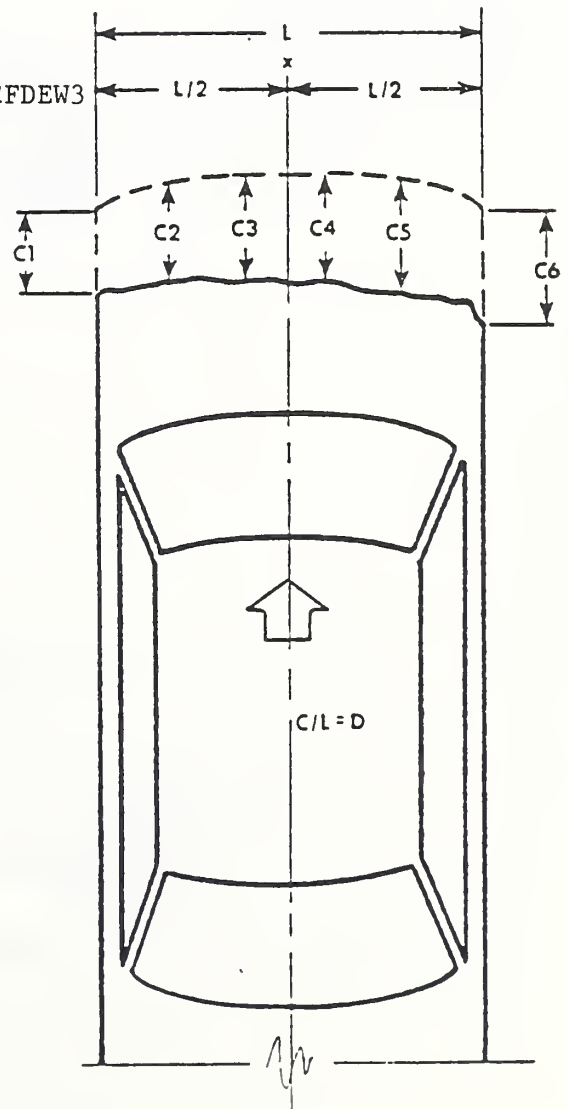
C4 = 20.4 inches

C5 = 20.0 inches

C6 = 19.1 inches

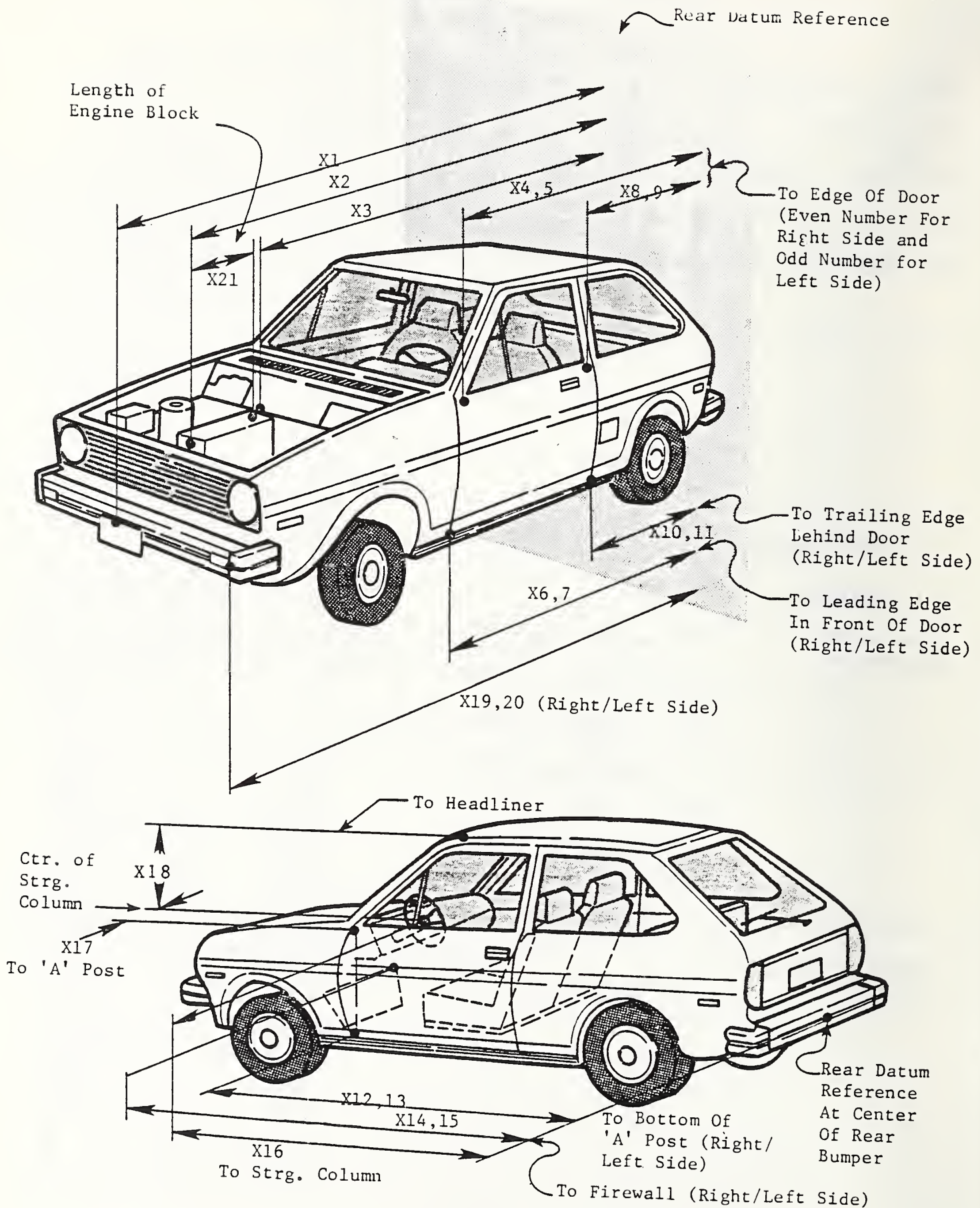
MIDPOINT OF DAMAGE: D = Vehicle Centerline  
(Longitudinal)

LENGTH OF DAMAGED  
REGION: L = 54.8 inches





# PRE-TEST AND POST-TEST MEASUREMENT POINTS



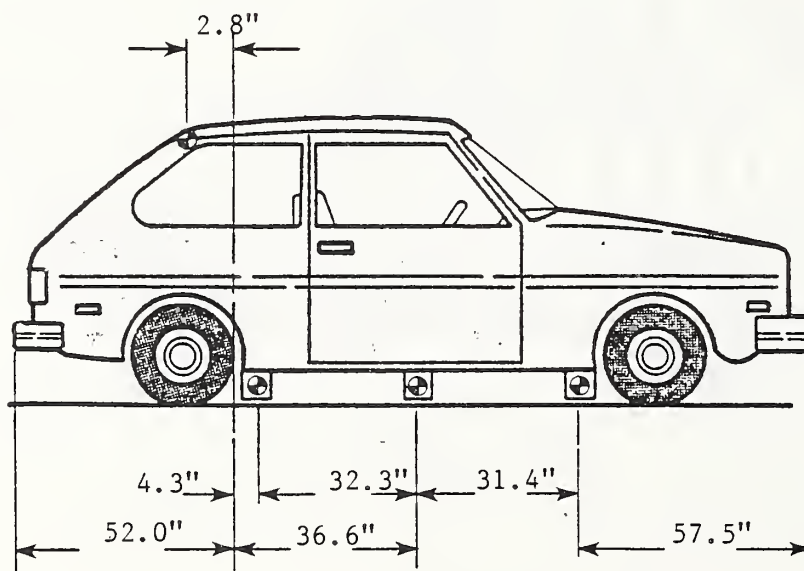
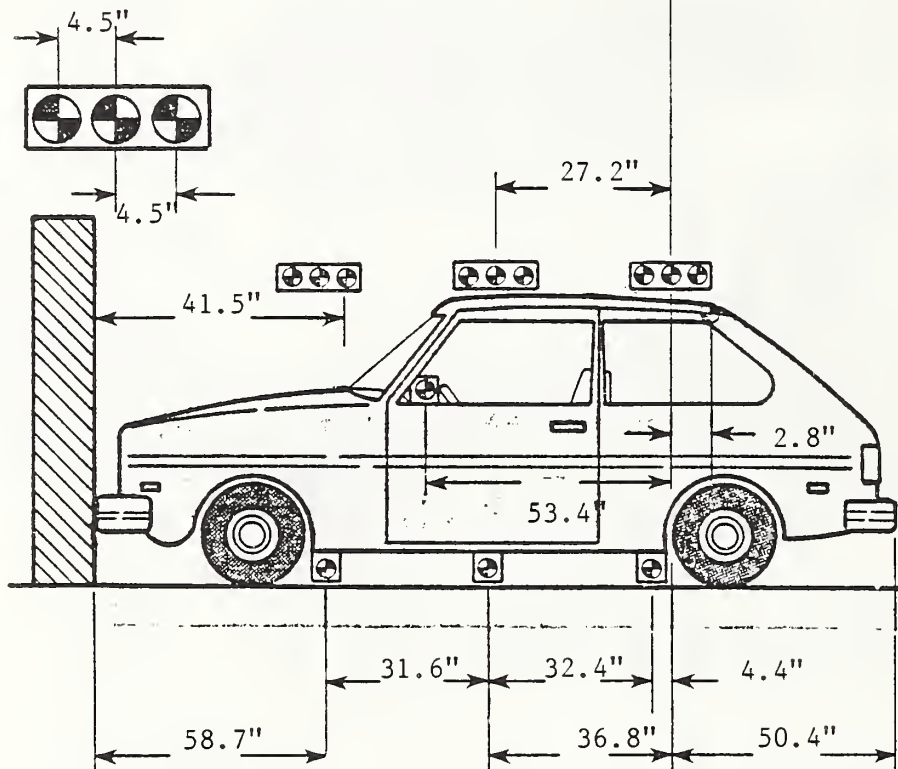
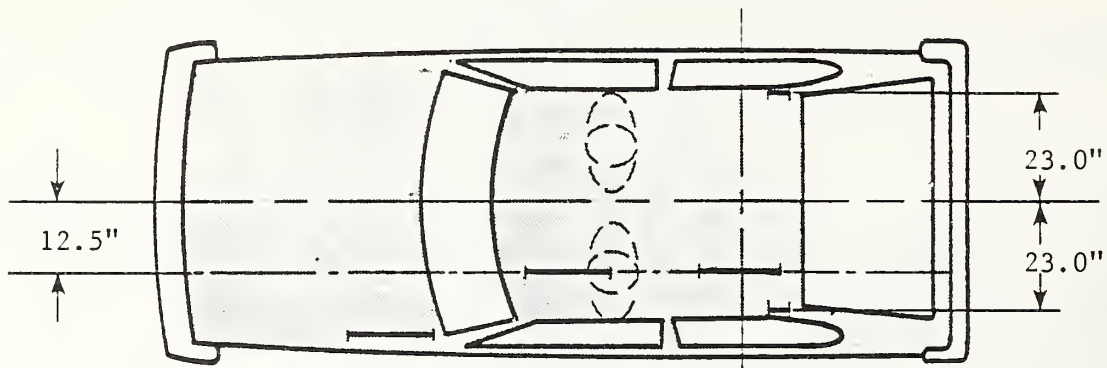
# IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL Subaru XT

TEST NUMBER 871013

NO.	TYPE OF MEASUREMENT	DIMENSIONS IN INCHES		
		PRE-TEST	POST-TEST	DIFF.
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	177.5	157.9	19.6
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	155.0	147.8	7.2
X3	REAR SURFACE OF VEHICLE TO FIREWALL	124.0	122.8	1.2
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	116.1	116.0	0.1
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	116.0	116.0	0.0
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	118.2	118.2	0.0
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	118.1	118.2	-0.1
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	70.4	70.5	-0.1
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	70.2	70.4	-0.2
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	70.9	70.6	0.3
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	70.8	70.6	0.2
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	117.4	117.5	-0.1
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	117.7	117.2	0.5
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	127.0	126.8	0.2
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	126.9	126.3	0.6
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	98.1	98.3	-0.2
X17	CENTER OF STEERING COLUMN TO "A" POST	12.2	11.0	1.2
X18	CENTER OF STEERING COLUMN TO HEADLINING	15.9	14.0	1.9
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	175.0	155.9	19.1
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	174.9	157.0	17.9
X21	LENGTH OF ENGINE BLOCK	17.0	17.0	0.0

# VEHICLE TARGET LOCATIONS





SECTION 2.0

SUMMARY OF TEST RESULTS

## DATA SUMMARY

The driver's Head Injury Criteria, HIC, was 574. The driver's maximum chest deceleration over three milliseconds was 37.0 g. The driver's right and left compressive femur loads were 1081.5 pounds and 794.9 pounds, respectively. The driver's maximum chest displacement was 2.5 inches.

The right front passenger's Head Injury Criteria, HIC, was 1238. The right front passenger's maximum chest deceleration over three milliseconds was 34.9 g. The right front passenger's right and left compressive femur loads were 479.4 pounds and 549.9 pounds, respectively. The right front passenger's maximum chest displacement was 2.6 inches.

The vehicle's restraint system met the comfort and convenience requirements of FMVSS 208.

# DUMMY DATA SUMMARY

DRIVER DUMMY					PASSENGER DUMMY				
SN: 045					SN: 143				
POSITIVE			NEGATIVE		POSITIVE			NEGATIVE	
DIRECTION*			DIRECTION**		DIRECTION*			DIRECTION**	
MAX	TIME		MAX	TIME	MAX	TIME		MAX	TIME
HEAD ACCELERATION (g)									
LONGITUDINAL	27.1	176.0	42.3	97.4	279.7	147.9	63.0	94.5	
LATERAL	8.6	179.0	7.1	191.9	8.8	92.5	86.2	148.0	
VERTICAL	2.4	18.1	49.9	79.8	5.0	149.8	116.4	147.8	
RESULTANT	60.0	83.1			313.3	147.9			
HIC	574 from 65.4 to 101.4				1238 from 147.2 to 148.6				
NECK LOADS (lbs)									
SHEAR (X)	379.9	96.5	43.7	189.1	425.3	94.9	28.2	161.2	
AXIAL (Z)	487.8	82.2	83.2	221.8	626.8	98.0	235.6	183.6	
NECK MOMENTS (lb-ft)									
ABOUT LATERAL	63.5	93.2	28.9	225.4	94.7	93.0	45.1	190.1	
CHEST ACCELERATION (g)									
LONGITUDINAL	5.7	134.1	37.6	79.9	8.7	136.9	35.1	66.5	
LATERAL	5.4	68.5	2.7	98.4	2.8	92.2	4.0	80.8	
VERTICAL	10.2	107.4	3.2	242.8	10.0	107.0	4.9	205.0	
RESULTANT	37.7	75.4			35.2	66.5			
3 MSEC CLIP	37.0				34.9				
CHEST DISPLACEMENT (in)									
	2.5	82.2	0.0	6.1	2.6	78.4	0.0	2.2	
FEMUR LOADS (lbs)									
LEFT	94.3	206.6	794.9	83.0	156.3	18.2	549.9	70.0	
RIGHT	181.0	152.2	1081.5	83.0	118.6	238.1	479.4	104.6	
*LONGITUDINAL:	FORWARD				**LONGITUDINAL:	REARWARD			
LATERAL:	LEFTWARD				LATERAL:	RIGHTWARD			
VERTICAL:	UPWARD				VERTICAL:	DOWNWARD			
DISPLACEMENT:	INWARD				DISPLACEMENT:	OUTWARD			
FORCE:	TENSION				FORCE:	COMPRESSION			

SEAT BELT DATA SUMMARY

<u>LOCATION</u>	<u>SEAT BELT TENSION</u>	
	<u>MAX. LBS.</u>	<u>TIME.MSEC.</u>
DRIVER PASSIVE BELT INBOARD	1589.6	81.9
RIGHT FRONT PASSENGER PASSIVE BELT INBOARD	1906.8	84.6

## DUMMY KINEMATIC SUMMARY

### DRIVER DUMMY

Upon impact, the driver dummy translated forward on the seat impacting both knees into the dash panel. The dummy's head rotated forward, contacting the steering wheel hub and the chin contacting the chest, as the driver's chest was restrained by the two-point, motorized, passive seatbelt. The dummy's head rotated rearward into the head restraint as the dummy rebounded into the seatback. The driver dummy came to rest seated in the driver's seat restrained by the two-point passive seatbelt.

### PASSENGER DUMMY

Upon impact, the passenger dummy translated forward on the seat impacting both knees into the dash panel. The passenger's head rotated forward as the dummy's chest was restrained by the two-point, motorized, passive seatbelt. The dummy's chin contacted its upper chest. The dummy's head rotated rearward into the top of the seat back as the dummy rebounded into the seatback. The passenger dummy came to rest laying in the passenger's seat, facing forward and partially restrained by the two-point passive seatbelt.

VISIBLE DUMMY CONTACT POINTS:

	DRIVER	PASSENGER
Head	<u>Steering wheel</u>	<u>Chest</u>
Chest	<u>None</u>	<u>None</u>
Abdomen	<u>None</u>	<u>None</u>
Left Knee	<u>Instrument panel</u>	<u>Instrument panel</u>
Right Knee	<u>Instrument panel</u>	<u>Instrument panel</u>

DOOR OPENING:

	LEFT	RIGHT
Front	<u>Easy</u>	<u>Easy</u>
Rear	<u>NA</u>	<u>NA</u>

SEAT MOVEMENT:

	SEAT BACK FAILURE	SEAT SHIFT
Front	<u>Passenger's seat shifted rearward</u>	<u>None</u>
Rear	<u>NA</u>	<u>NA</u>

GLAZING DAMAGE:

The left side of windshield was cracked.

\_\_\_\_\_

\_\_\_\_\_

OTHER NOTABLE IMPACT EFFECTS:

The passenger's head restraint came off of

the seat.

\_\_\_\_\_

\_\_\_\_\_

DUMMY POSITIONING DATA FOR  
35 MPH FRONTAL BARRIER IMPACT TEST

PRE-IMPACT DATA:

Make/Model: Subar/XT  
Body Style: 2-door coupe Model Year: 1987  
NHTSA No.: \_\_\_\_\_ Color: White

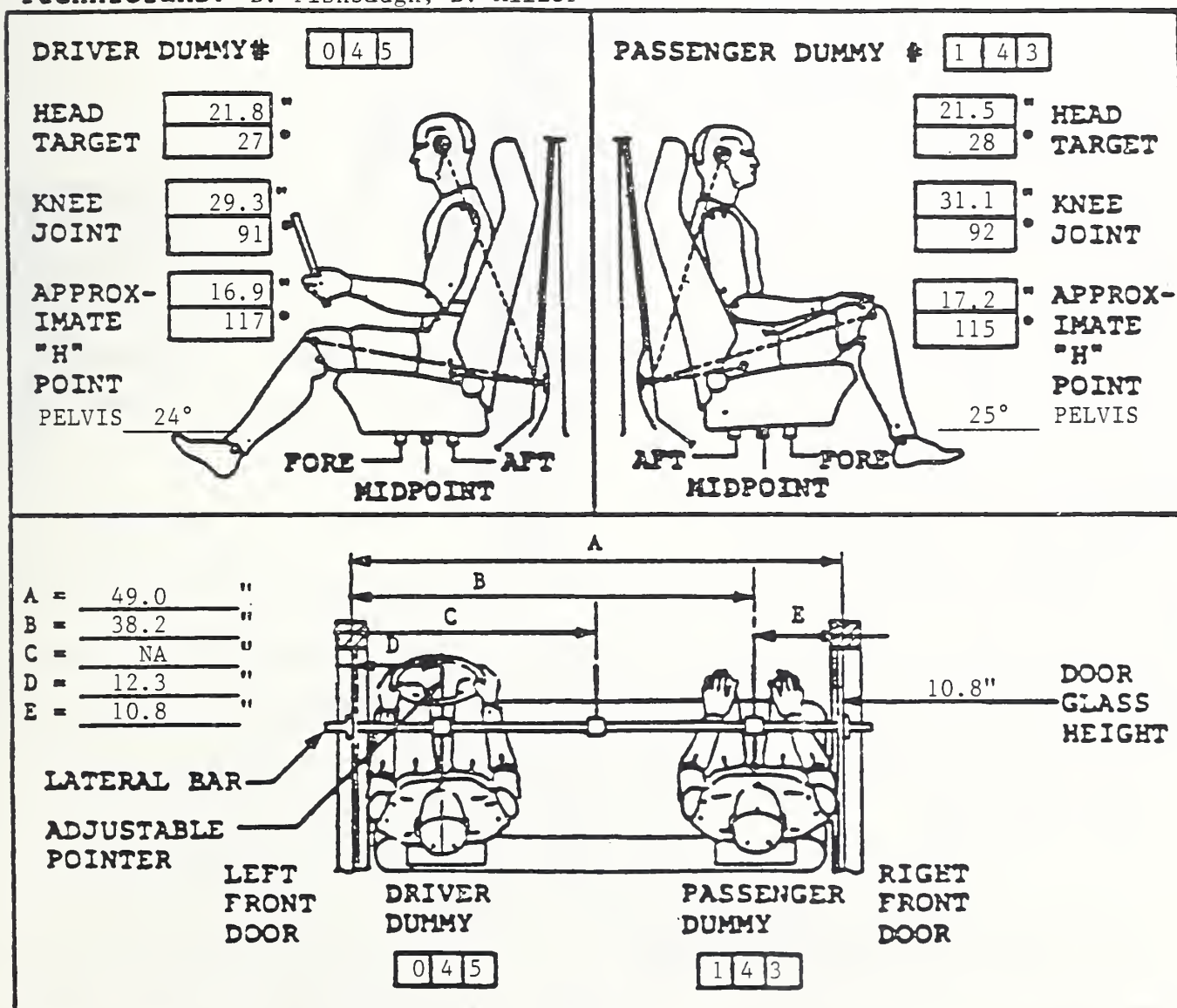
DATA FROM CERTIFICATION LABEL:

Vehicle Manufacturer: Fuji Heavy Ind.  
Date of Manufacture: 6/87 ; VIN: JF1AX4224HB317081  
GVWR: 3090 lb; GAWR: Front = 1630 lb; Rear = 1460 lb

POST-IMPACT DATA:

Date of Test: 10/13/87 Time: 1321 Temperature 69 °F  
Required Impact Velocity Range: 28.9 to 29.9 mph  
Impact Velocity: Primary = 29.5 mph Secondary = 29.5 mph  
Seat Type: Bucket Adjuster Type: Manual  
Bucket Seat Back Type: Adjustable

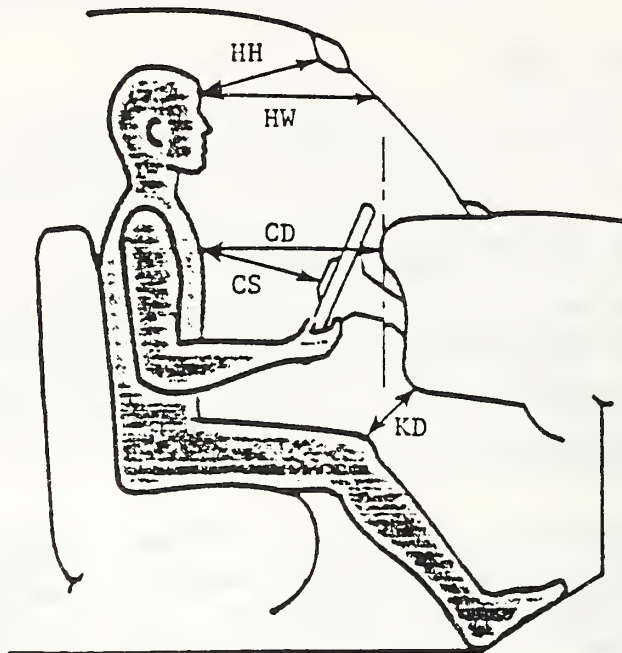
Technicians: B. Fishbaugh, B. Miller



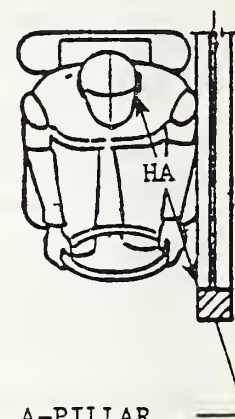
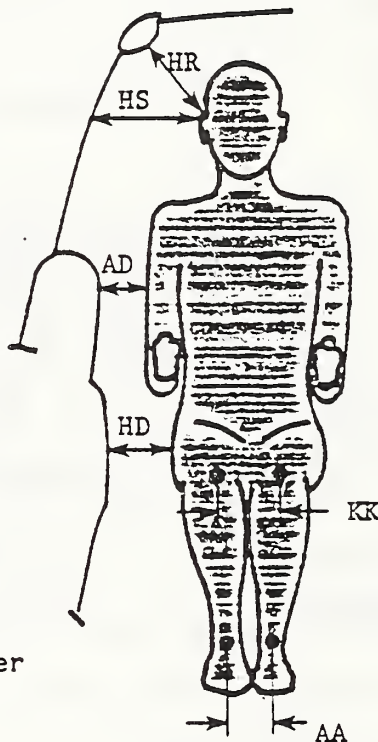


# DUMMY IN-VEHICLE POSITION RECORDING SHEET

	DRIVER 045	PASSENGER 143
HH	11.8	11.4
HW	16.8	18.6
CD	22.9	23.1
CS	11.9	NA
KDL	5.1	5.7
KDR	4.8	5.2
TA	15°	15°
SA	26°	26°
HA	10.1	11.6



	DRIVER 045	PASSENGER 134
HR	5.5	5.0
HS	9.1	7.6
AD	3.4	4.4
HD	7.4	7.9
KK	8.4	8.5
AA	8.5	8.0



A-PILLAR

Knee outer bolt head to outer bolt head spacing:

Driver = 10.6

Passenger = 10.6

HH = Head to Windshield Header  
 HW = Head to Windshield  
 CD = Chest to Dash  
 CS = Chest to Steering Wheel  
 KD = Knee to Dash  
 TA = Torso Angle  
 SA = Seat Back Angle

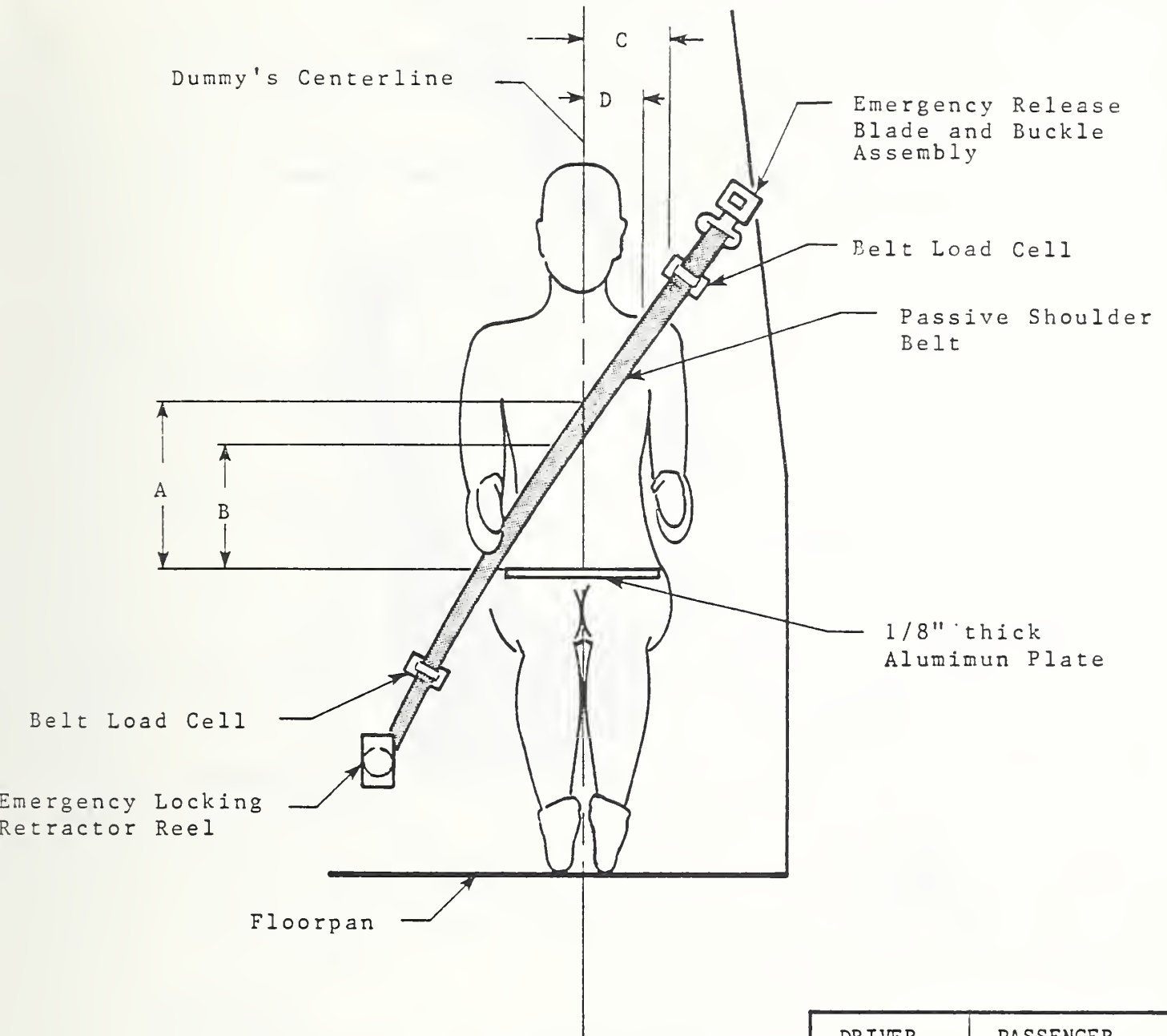
HR = Head to Side Roof  
 HS = Head to Side Window  
 AD = Arm to Door  
 HD = Hip to Door  
 KK = Knee to Knee  
 AA = Ankle to Ankle  
 HA = Head to A Pillar

Torso and seat back angles are relative to vertical.

ALL DISTANCE MEASUREMENTS IN INCHES

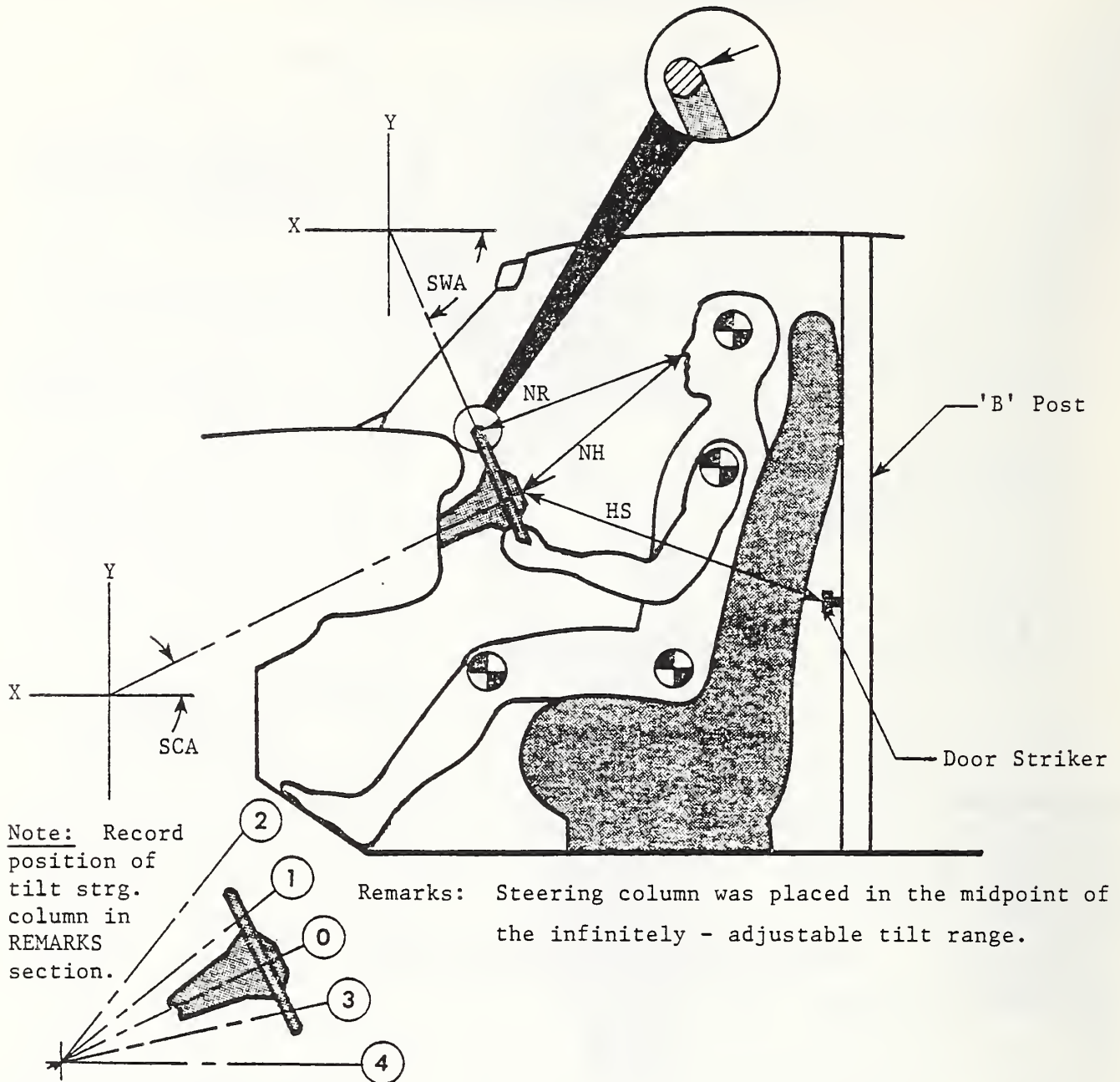


# SEAT BELT POSITIONING DATA



	DRIVER DUMMY	PASSENGER DUMMY
A - Top surface of alum. plate to belt upper edge (in)	12.6	11.8
B - Top surface of alum. plate to belt lower edge (in)	9.2	8.6
C - Dummy centerline to outer edge of belt at chest flesh top (in)	4.4	3.8
D - Dummy centerline to inner edge of belt at chest flesh top (in)	2.1	1.5

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS



<u>MEASUREMENTS</u>	
NR - Distance from tip of dummy's nose to top rear surface of steering wheel rim.	14.7
NH - Distance from tip of dummy's nose to center of steering column hub.	15.0
HS - Distance from center of steering column hub to the forward surface of the door lock striker pin.	28.8
SCA - Angle of steering column relative to the horizontal X axis.	20°
SWA - Angle of steering wheel relative to the horizontal X axis.	70°

FMVSS 208 COMFORT AND CONVENIENCE DATA

VEHICLE VIN NO.: JF1AX4224HB317081

MAKE: Subaru MODEL: XT

VEHICLE BUILD DATE: 6/87 VEHICLE TYPE 2 door coupe

FRONT OUTBOARD SEATING POSITIONS SEAT BELT TYPE:

(check one): X Automatic belts  
       Type 2 lap/shoulder belts  
       Other

CONVENIENCE HOOKS: NA, vehicle's restraint system did not include convenience hooks.

WEBBING TENSION - RELIEVING DEVICE:

DO OUTBOARD SEATING POSITION BELTS HAVE TENSION - RELIEVING DEVICES?

No

MAXIMUM SLACK RECOMMENDED IN OWNERS MANUAL: NA INCHES

DOES OWNER'S MANUAL WARN THAT INTRODUCING SLACK BEYOND THE AMOUNT SPECIFIED CAN SIGNIFICANTLY REDUCE THE EFFECTIVENESS OF THE SHOULDER BELT?

NA

IF NO, EXPLAIN

AUTOMATIC BELTS: IS TENSION - RELIEVING DEVICE CANCELLED EACH TIME THE ADJACENT DOOR IS OPENED? NA

IF NO, EXPLAIN:

BELT CONTACT FORCE:

FOR BELTS WITHOUT TENSION-RELIEVING DEVICES: BELT CONTACT FORCE:

.4 POUNDS

LATCHPATE ACCESS: NA

RETRACTION: NA

ACCESSIBILITY: NA

LATCH MECHANISM: NA

FMVSS NO. 208 - SEAT BELT WARNING SYSTEM DATA

WITH OCCUPANT IN DRIVER'S POSITION AND LAP BELT IN STOWED POSITION AND  
IGNITION SWITCH PLACED IN "START/ON" POSITION:

Duration of audible warning signal = 8 sec.

Duration of reminder light operation = 8 sec.

WITH OCCUPANT IN DRIVER'S POSITION AND LAP BELT IN USE AND THE IGNITION  
SWITCH PLACED IN "START/ON" POSITION:

Duration of audible warning signal - 0 sec.

(Note: audible warning should not operate)

Duration of reminder light operation = 8 sec.

Wording of visual warning:

Fasten Seat Belt           

Fasten Belt           

Symbol 101-80     X

FMVSS NO. 208 - LABELING AND DRIVER'S MANUAL DATA

DESCRIBE LOCATION OF LABEL WHICH DESCRIBES MANUFACTURER'S MAINTENANCE OR REPLACEMENT SCHEDULE FOR CRASH-DEPLOYED OCCUPANT PROTECTION SYSTEM: NA, vehicle did not contain a crash-deployed occupant protection system.

FMVSS NO. 208 - READINESS INDICATOR DATA

AN OCCUPANT RESTRAINT SYSTEM THAT DEPLOYS IN THE EVENT OF A CRASH SHALL HAVE A MONITORING SYSTEM WITH A READINESS INDICATOR. A TOTALLY MECHANICAL SYSTEM IS EXEMPT FROM THIS REQUIREMENT. NA, vehicle did not contain a crash-deployed occupant protection system.

SECTION 3.0

CAMERA INFORMATION

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# HIGH SPEED CAMERA LOCATIONS

TEST NO.: 871013 VEHICLE: Subaru XT DL

CAMERA NO.	VIEW	CAMERA POSITIONS (IN)*			ANGLE ** (DEG)	FILM PLANE TO HEAD TARGET	LENS (MM)	SPEED (FPS)
1	Real time panning	-142.0	504.0	61.0	NA	NA	16	24
2	Vehicle crush	-81.3	266.4	37.1	-2	NA	13	502
3	Dummy kinematics	-41.5	-295.0	44.0	-4	252.8	25	500
4	Windshield damage	-6.0	0.0	89.0	40	NA	13	505
5	Crush & fluid spillage	-50.5	0.0	-92.4	90	NA	13	1002
6	Fluid spillage	-99.3	0.0	-99.0	90	NA	13	502
7	Passenger kinematics	-4.5	13.8	93.0	-50	NA	17	505
8	Driver kinematics	-6.8	-14.5	93.0	-50	NA	17	1002
9	Driver kinematics	-157.3	116.0	87.0	-27	126.0	25	500
10	Passenger kinematics	-152.1	-116.0	87.0	-26	131.5	25	502
11	Windshield intrusion	-38.1	306.1	44.0	0	NA	50	502
12	Windshield intrusion	-53.0	-309.4	42.3	0	NA	50	502
13	Column movement	-139.0	-286.0	103.0	-14	NA	25	500
14	Column movement	-139.0	-286.0	75.1	-9	NA	25	501
15	Passenger kinematics	-38.8	293.0	45.3	-4	250.5	25	485

\* X = Film plane to plane of barrier face  
Y = Film plane to monorail centerline  
Z = Film plane to ground  
\*\* Referenced to horizontal plane



## APPENDIX A

### PHOTOGRAPHS

1. PRE-TEST FRONT VIEW
2. PRE-TEST LEFT SIDE VIEW
3. POST-TEST LEFT SIDE VIEW
4. PRE-TEST RIGHT SIDE VIEW
5. POST-TEST RIGHT SIDE VIEW
6. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW
7. POST-TEST RIGHT FRONT THREE-QUARTER VIEW
8. PRE-TEST LEFT REAR THREE-QUARTER VIEW
9. PRE-TEST REAR VIEW
10. POST-TEST REAR VIEW
11. PRE-TEST WINDSHIELD VIEW
12. POST-TEST WINDSHIELD VIEW
13. PRE-TEST ENGINE COMPARTMENT VIEW
14. PRE-TEST FRONT UNDERBODY VIEW
15. POST-TEST FRONT UNDERBODY VIEW
16. PRE-TEST REAR UNDERBODY VIEW
17. POST-TEST REAR UNDERBODY VIEW
18. PRE-TEST DRIVER DUMMY POSITION VIEW
19. POST-TEST DRIVER DUMMY POSITION VIEW
20. PRE-TEST PASSENGER DUMMY POSITION VIEW
21. POST-TEST PASSENGER DUMMY POSITION VIEW
22. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW
23. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW
24. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR VIEW
25. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1
26. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2
27. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 1
28. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT \_ VIEW 2
29. POST-TEST PASSENGER DUMMY HEAD/KNEE CONTACT - VIEW 1
30. POST-TEST PASSENGER DUMMY HEAD/KNEE CONTACT - VIEW 2
31. PRE-TEST VEHICLE TIRE LOAD AND CERTIFICATION LABEL VIEW



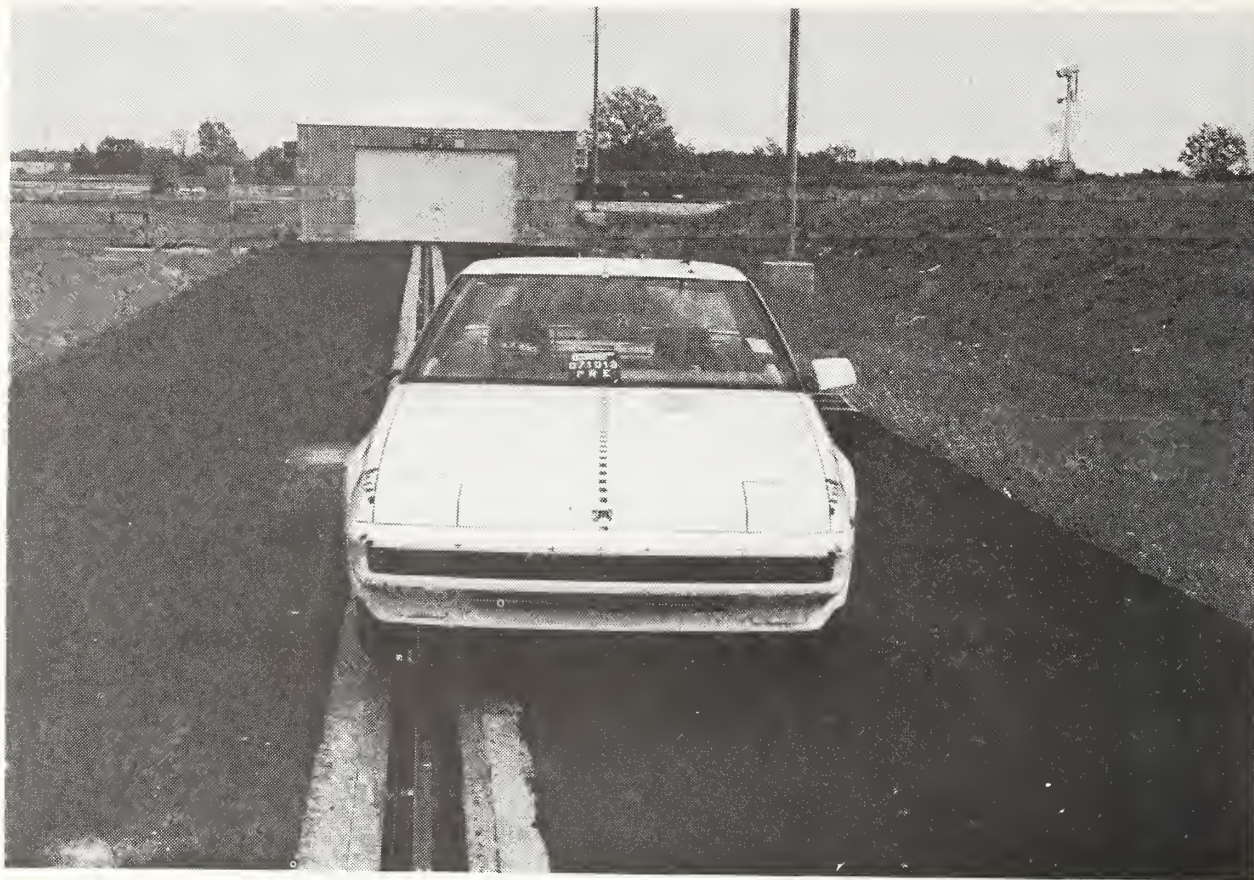


Figure 1. PRE-TEST FRONT VIEW



Figure 2. PRE-TEST LEFT SIDE VIEW





Figure 3. POST-TEST LEFT SIDE VIEW



Figure 4. PRE-TEST RIGHT SIDE VIEW





Figure 5. POST-TEST RIGHT SIDE VIEW



Figure 6. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW  
A-4





Figure 3. POST-TEST LEFT SIDE VIEW

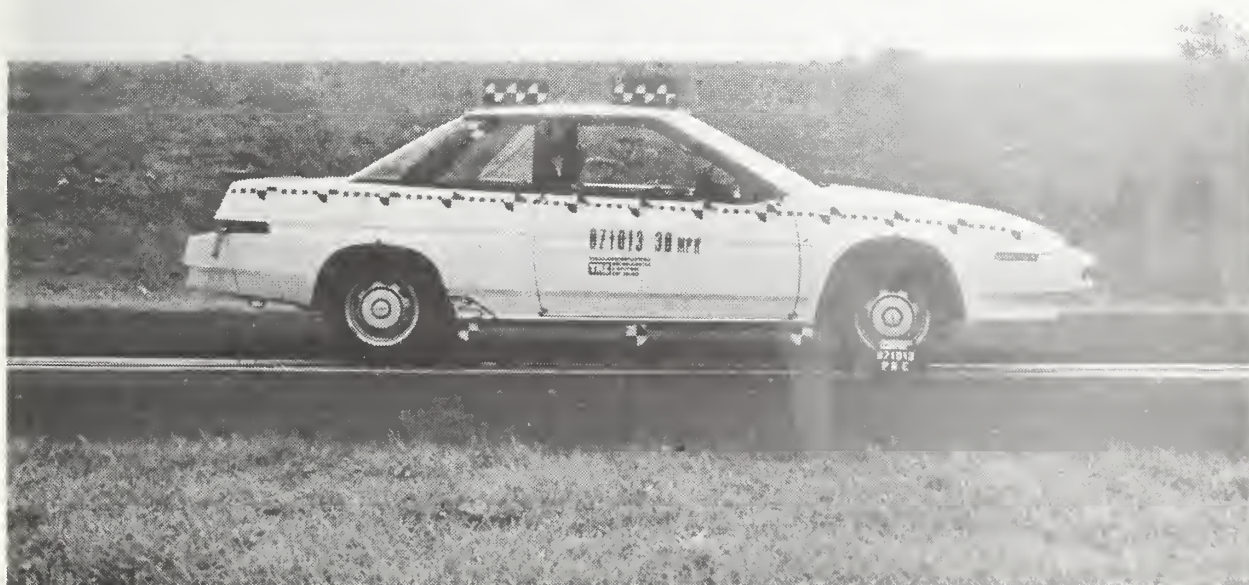


Figure 4. PRE-TEST RIGHT SIDE VIEW





Figure 5. POST-TEST RIGHT SIDE VIEW

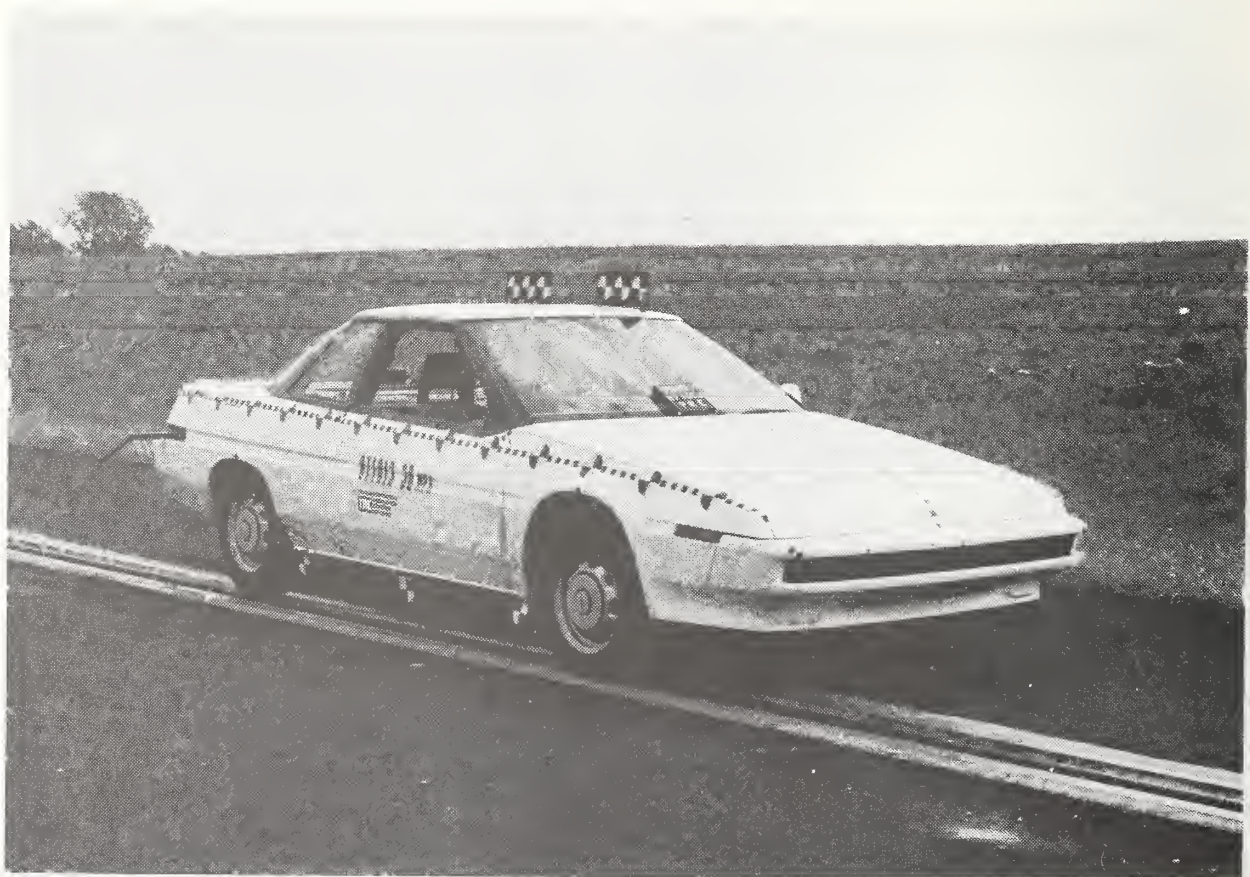


Figure 6. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW  
A-4



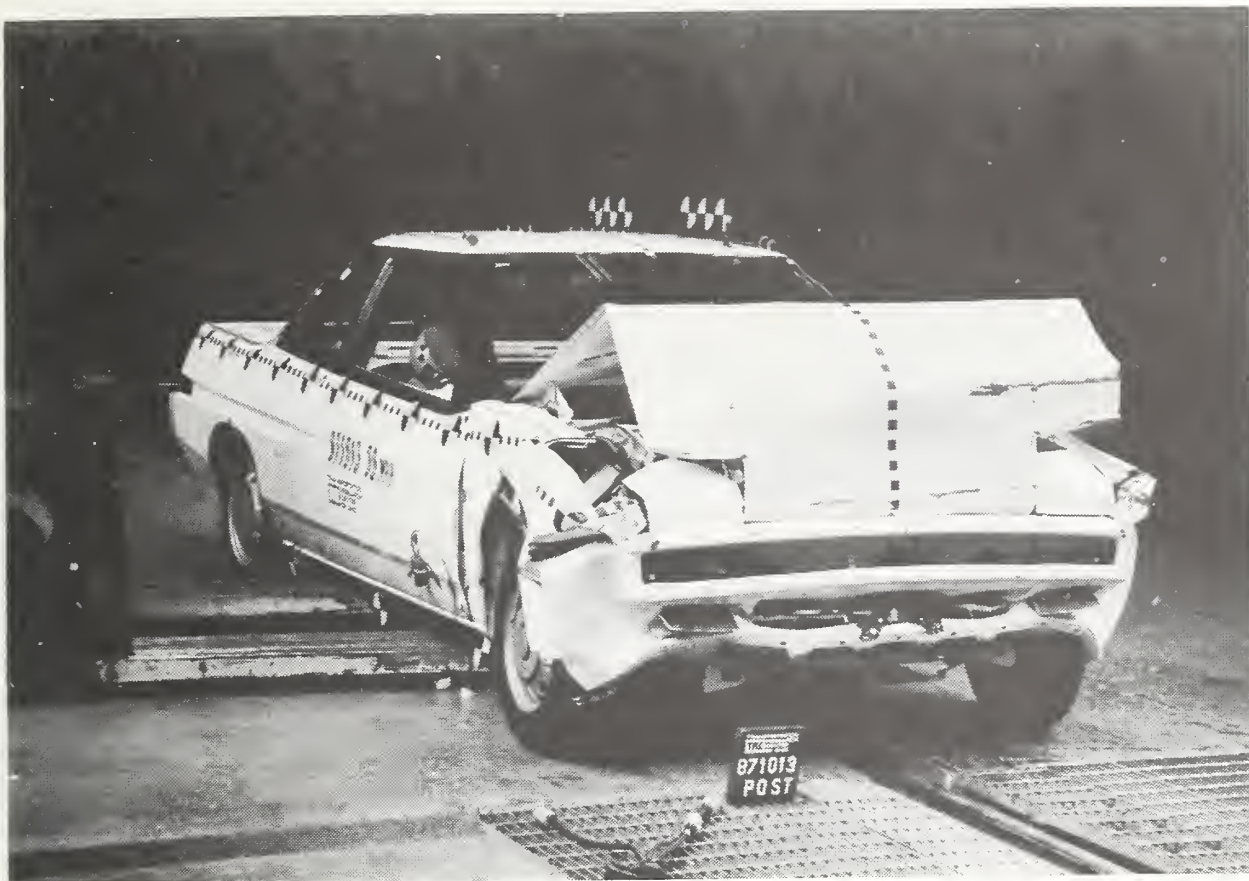


Figure 7. POST-TEST RIGHT FRONT THREE-QUARTER VIEW



Figure 8. PRE-TEST LEFT REAR-QUARTER VIEW  
A-5





Figure 9. PRE-TEST REAR VIEW

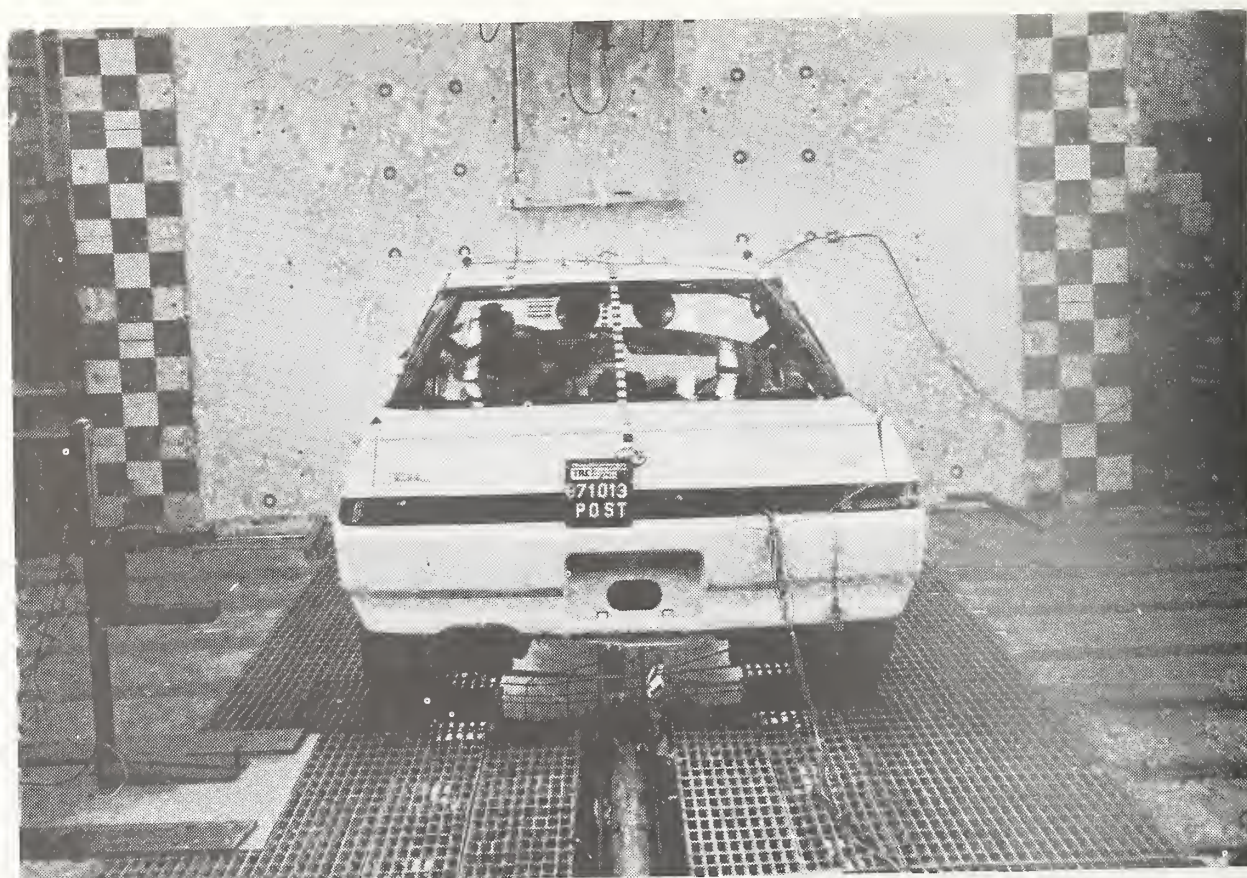


Figure 10. POST-TEST REAR VIEW  
A-6





Figure 11. PRE-TEST WINDSHIELD VIEW



Figure 12. POST-TEST WINDSHIELD VIEW



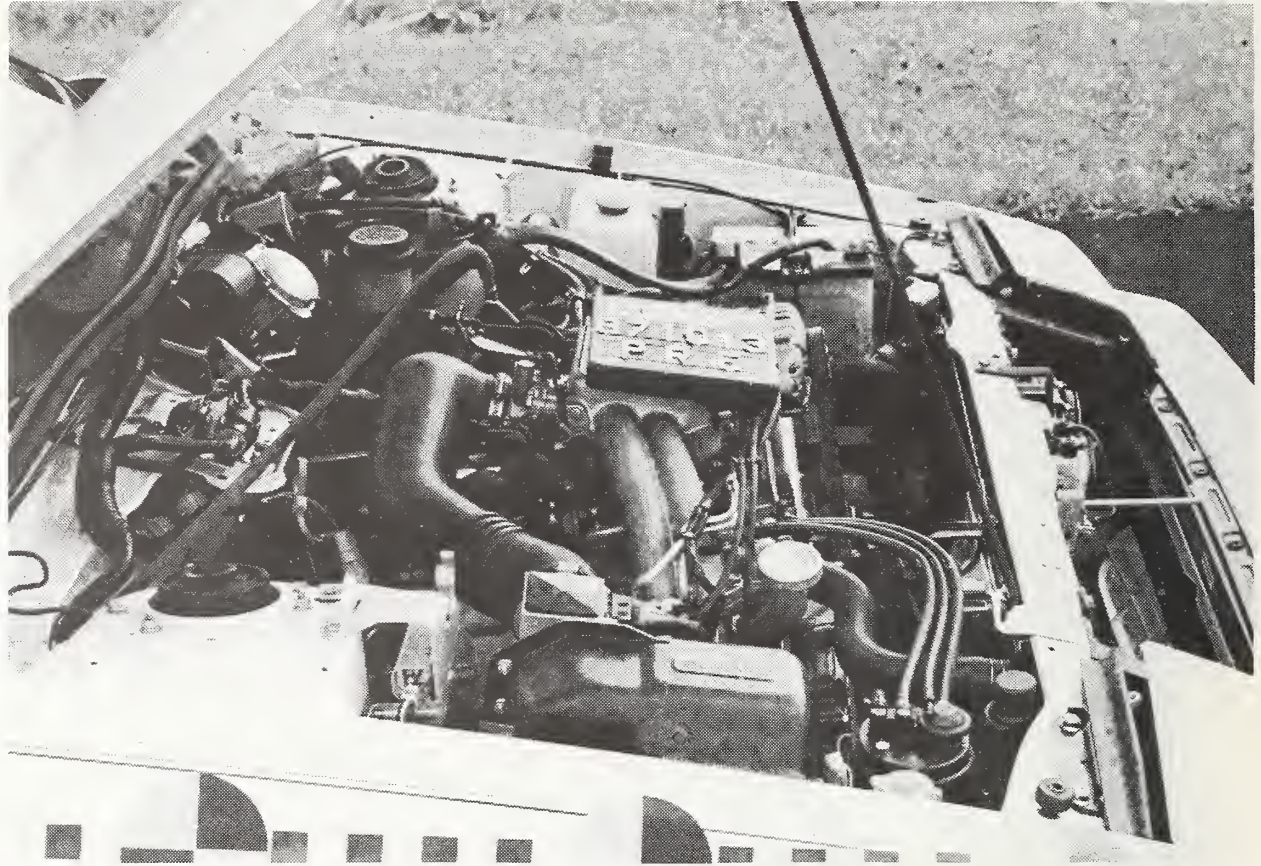


Figure 13. PRE-TEST ENGINE COMPARTMENT VIEW

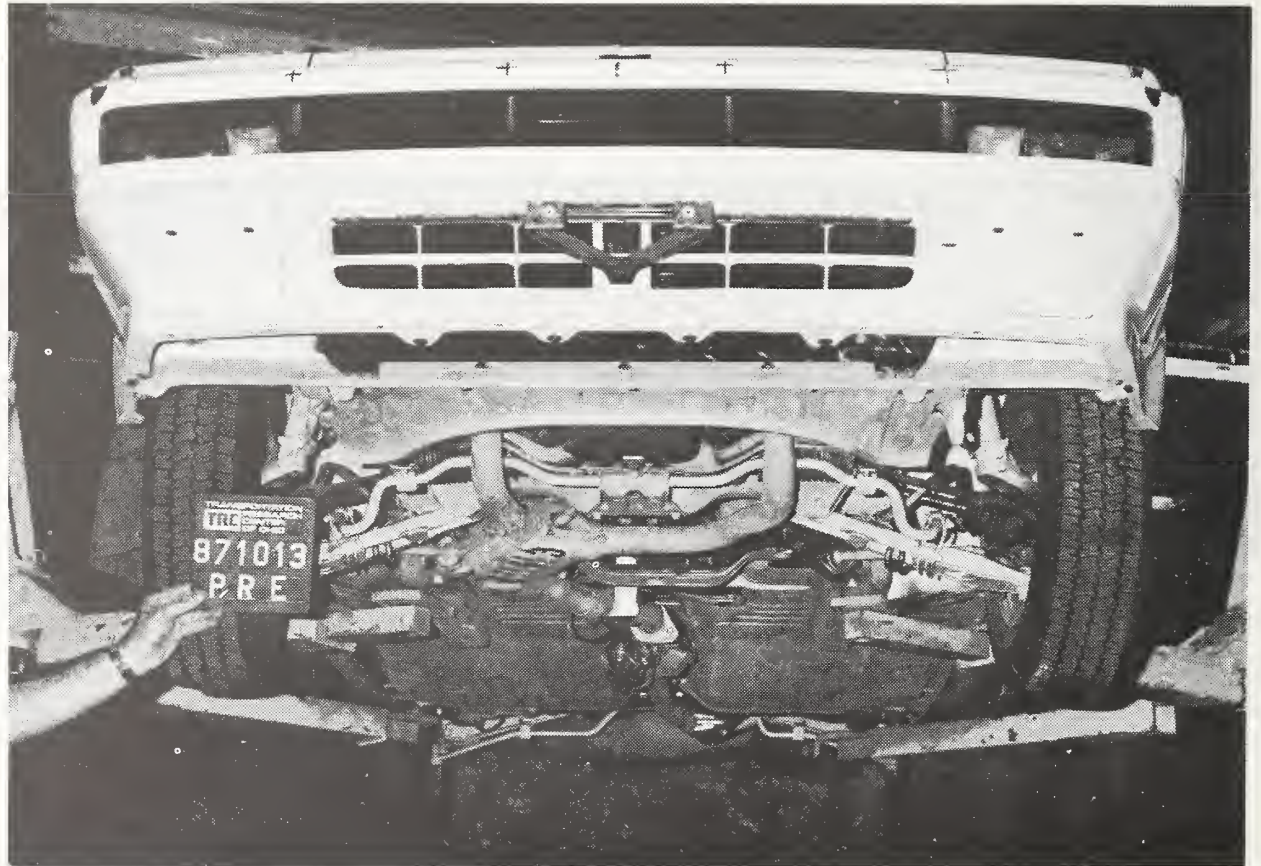


Figure 14. PRE-TEST FRONT UNDERBODY VIEW  
A-8



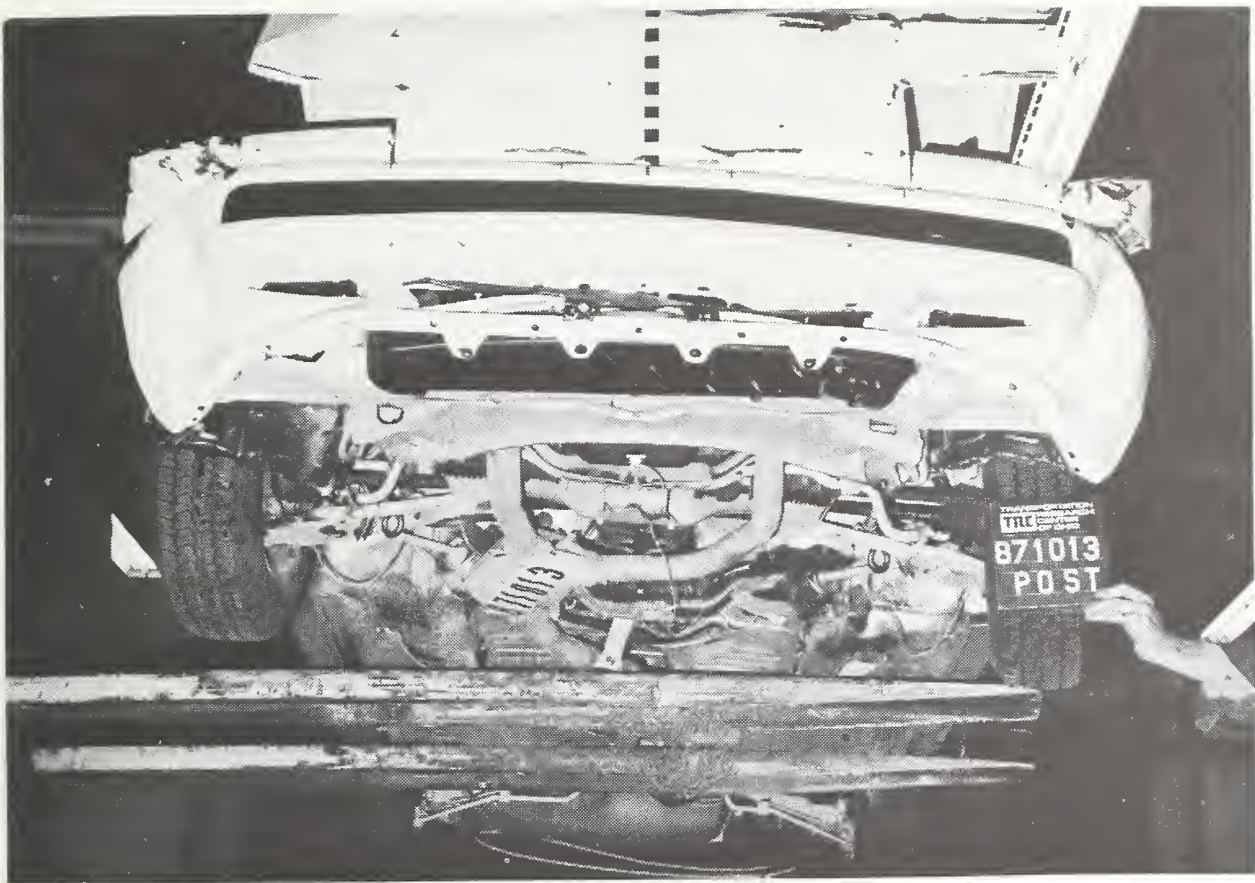


Figure 15. POST-TEST FRONT UNDERBODY VIEW

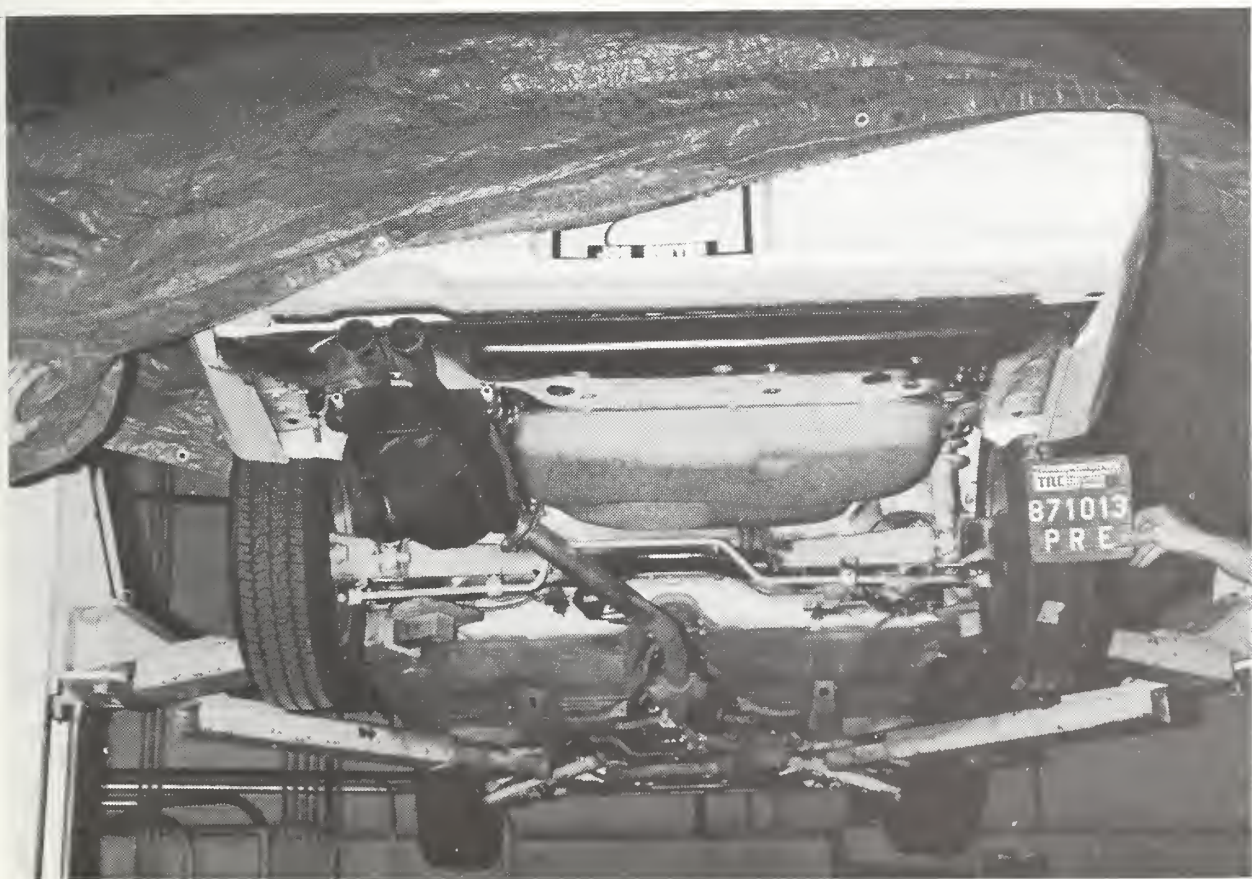


Figure 16. PRE-TEST REAR UNDERBODY VIEW



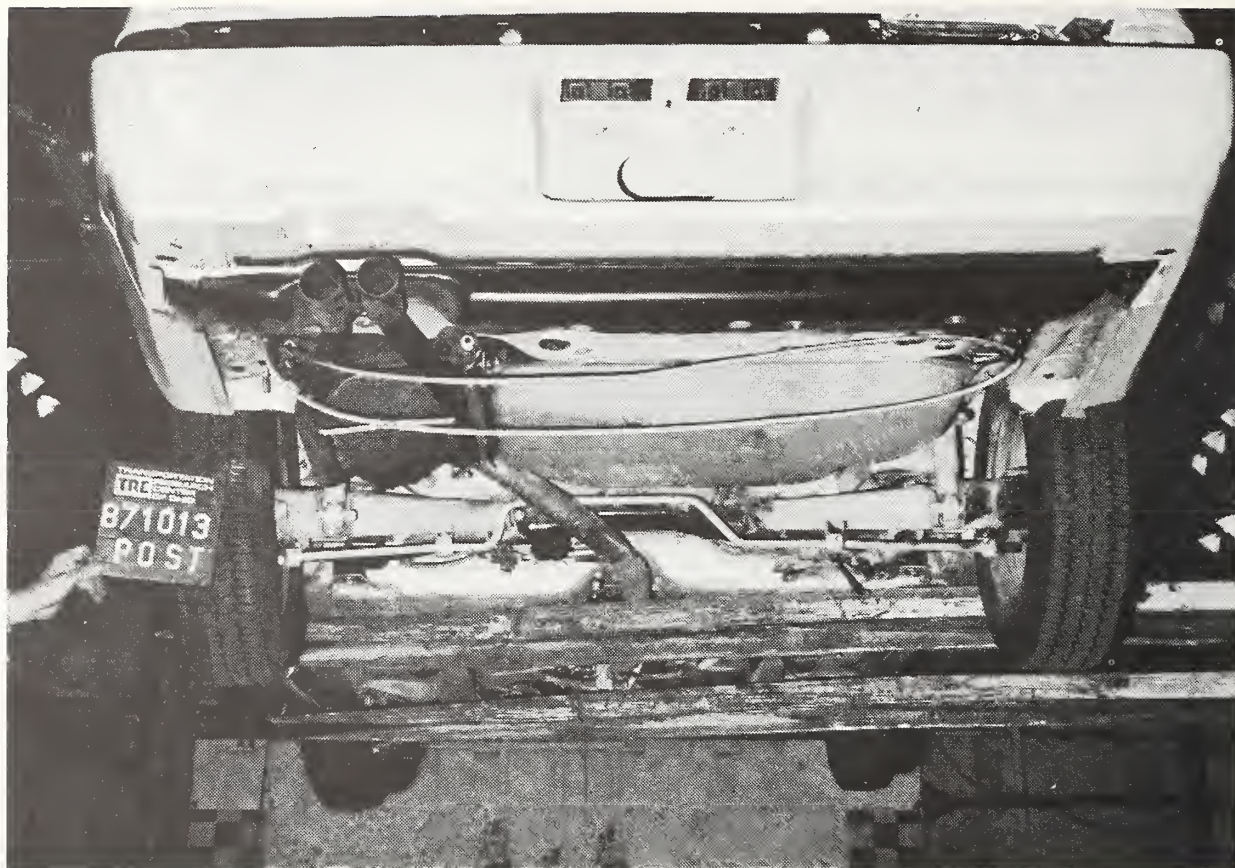


Figure 17. POST-TEST REAR UNDERBODY VIEW



Figure 18. PRE-TEST DRIVER DUMMY POSITION VIEW





Figure 19. POST-TEST DRIVER DUMMY POSITION VIEW

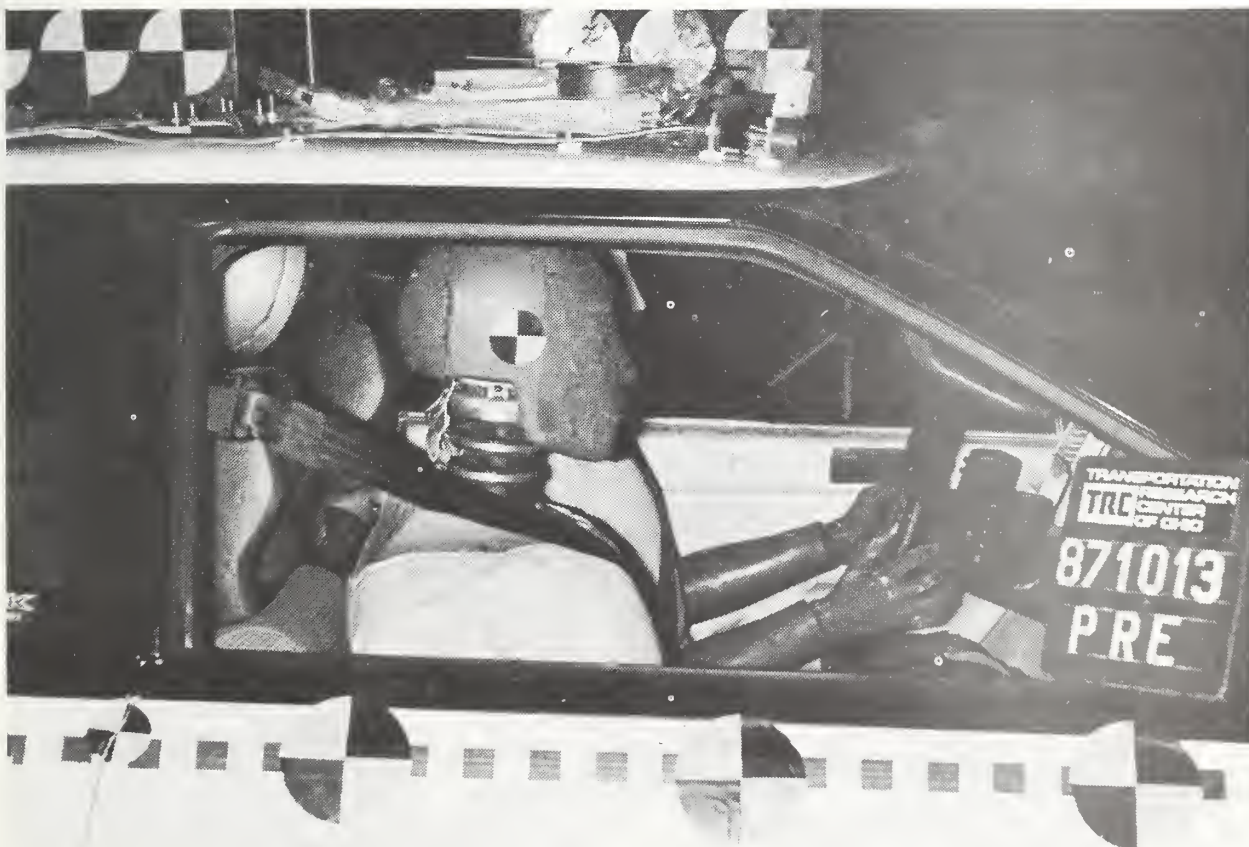


Figure 20. PRE-TEST PASSENGER DUMMY POSITION VIEW





Figure 21. POST-TEST PASSENGER DUMMY POSITION VIEW

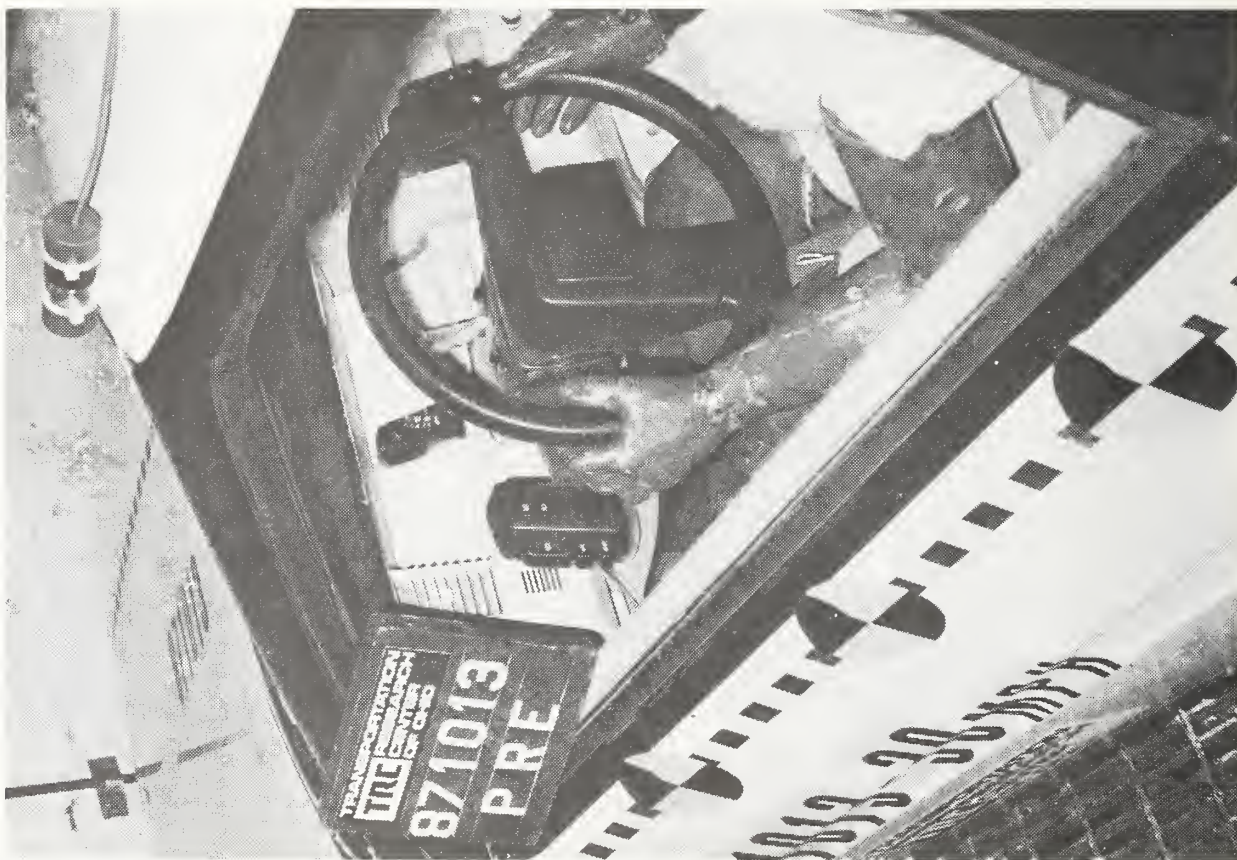


Figure 22. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW



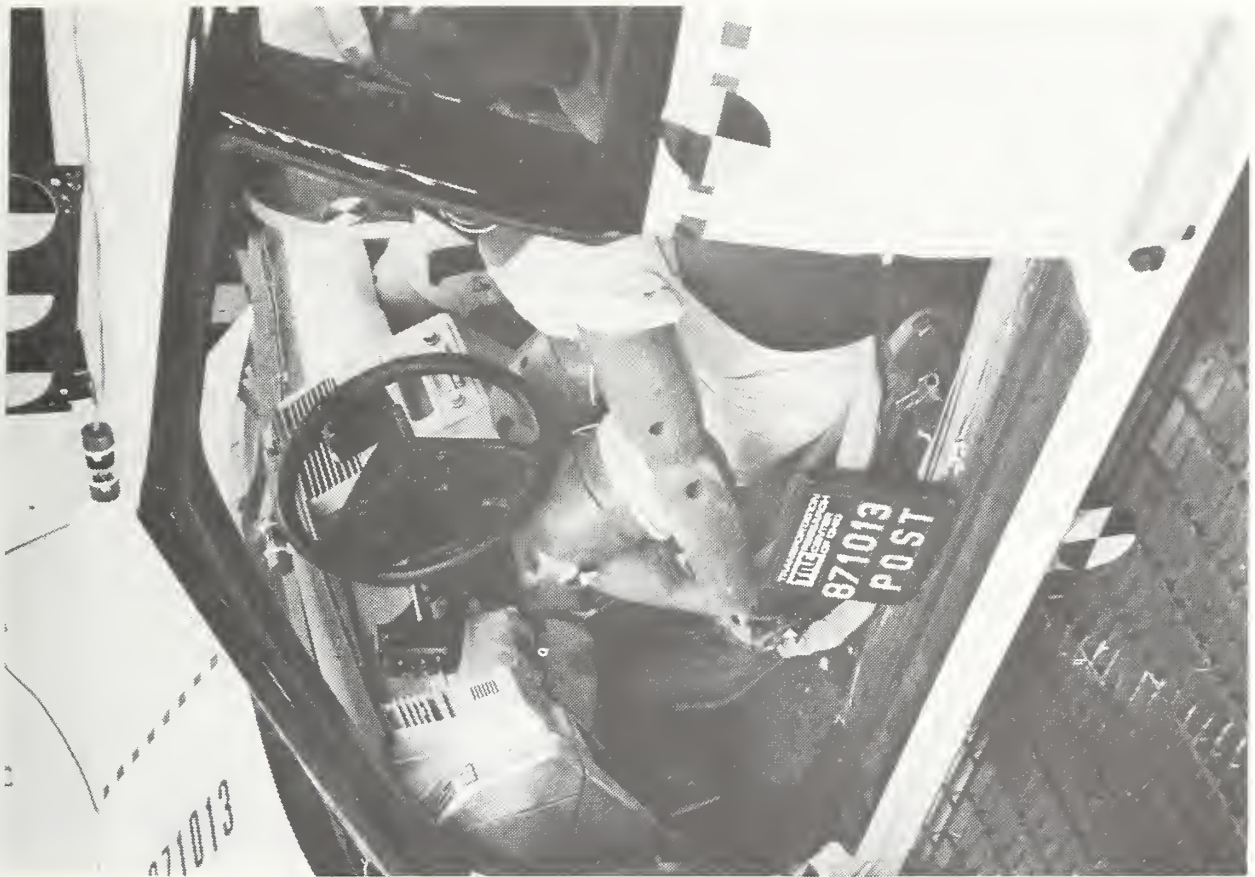


Figure 23. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW



Figure 24. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR VIEW





Figure 25. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1



Figure 26. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2



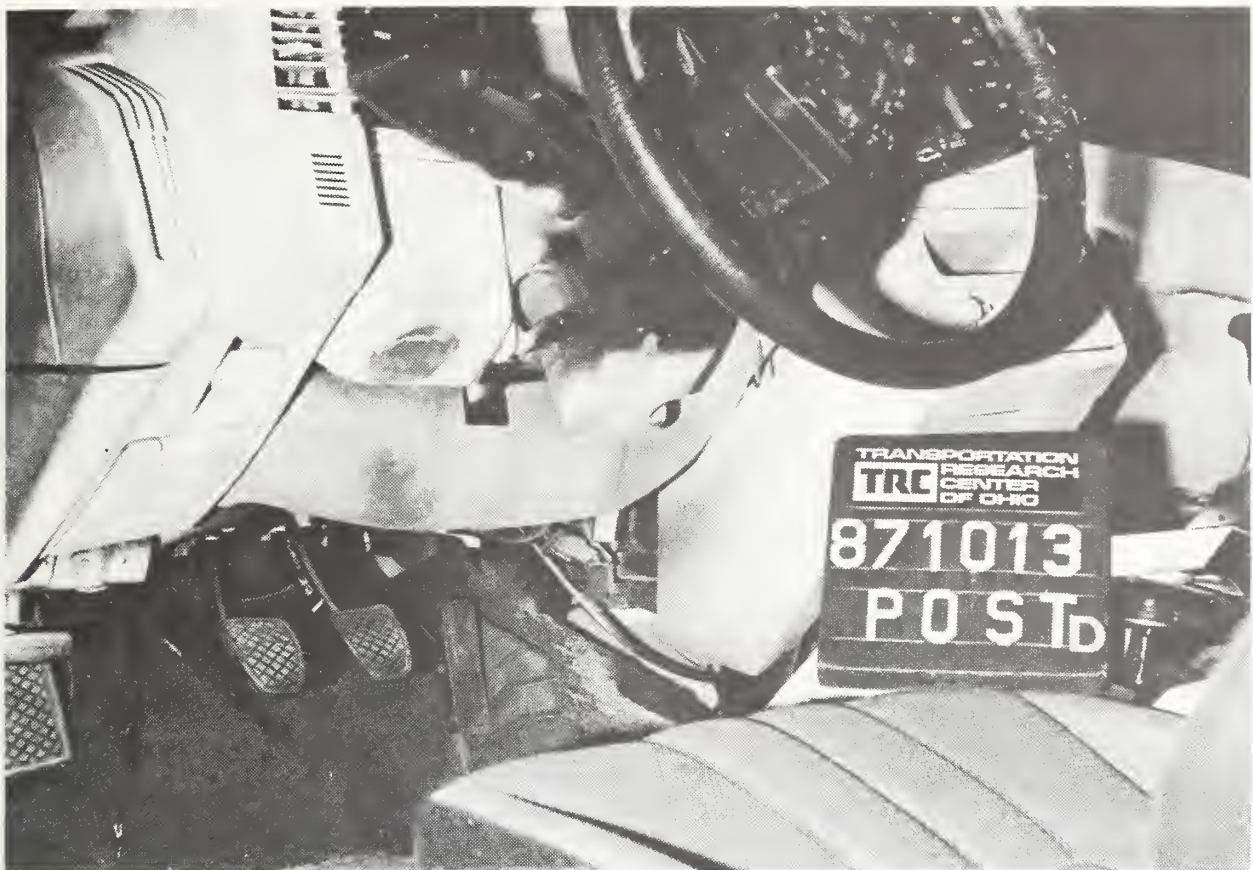


Figure 27. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 1



Figure 28. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 2



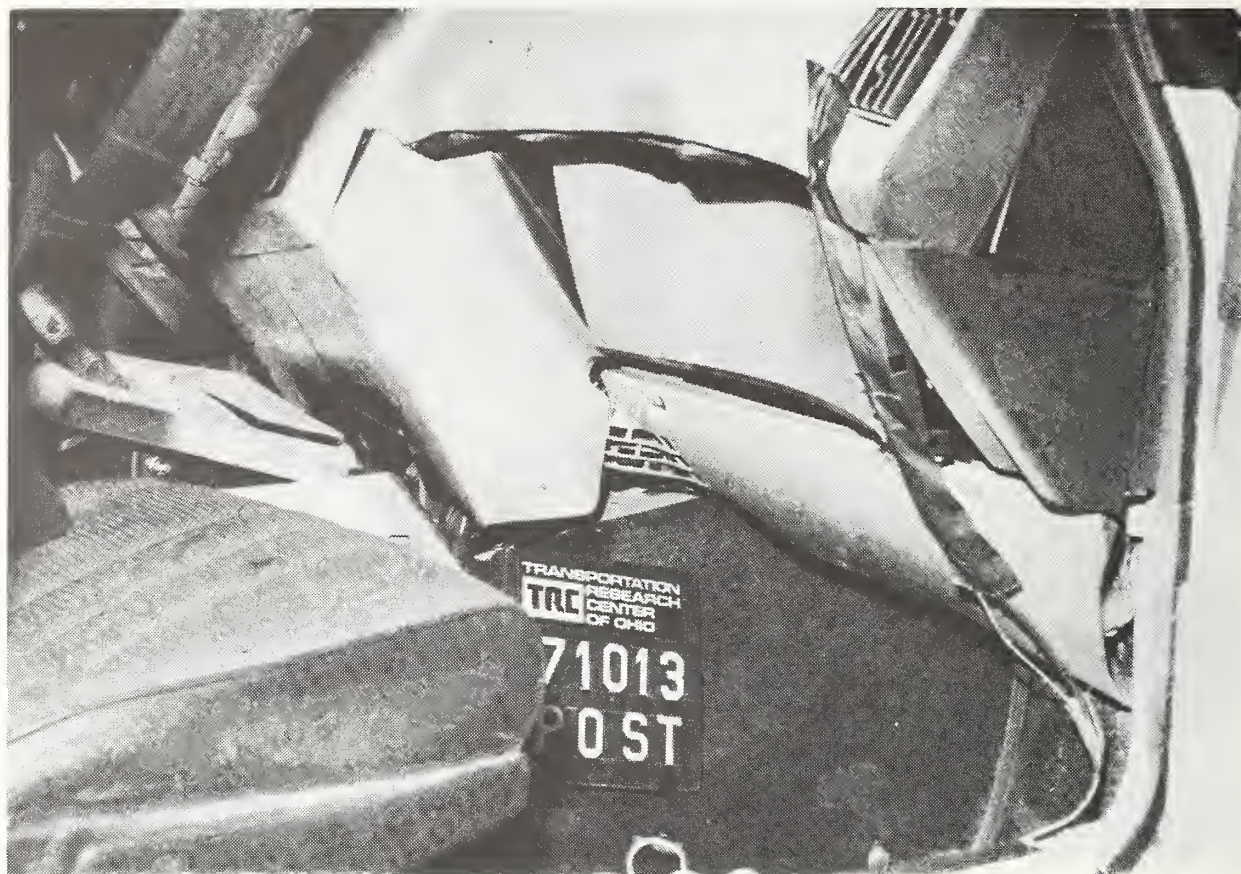


Figure 29. POST-TEST PASSENGER DUMMY HEAD/KNEE CONTACT - VIEW 1



Figure 30. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 2



MFD BY FUJIHEAVY IND. LTD., JAPAN

MFD IN **USA**

**JF1ARW22W**

**49317031**

GVWR: 3090LB(1401KG)

GAWR: FRONT - 1630LB( 739KG)

REAR - 1460LB( 662KG)

THIS VEHICLE CONFORMS TO ALL  
 APPLICABLE FEDERAL MOTOR VEHICLE  
 SAFETY BUMPER, AND THEFT PREVENTION  
 STANDARDS IN EFFECT ON THE DATE OF  
 MANUFACTURE SHOWN ABOVE.

PASSENGER CAR

-CAPACITY WEIGHT: 660LB(300KG)

-NUMBER OF OCCUPANTS: 4(FRONT2/REAR 2)

-TIRE PRESSURE: 

FRONT	28 PSI
REAR	28 PSI

TIRE SIZE: 165SR13

(XT/880)

Figure 31. PRE-TEST VEHICLE TIRE LOAD AND CERTIFICATION LABEL VIEW



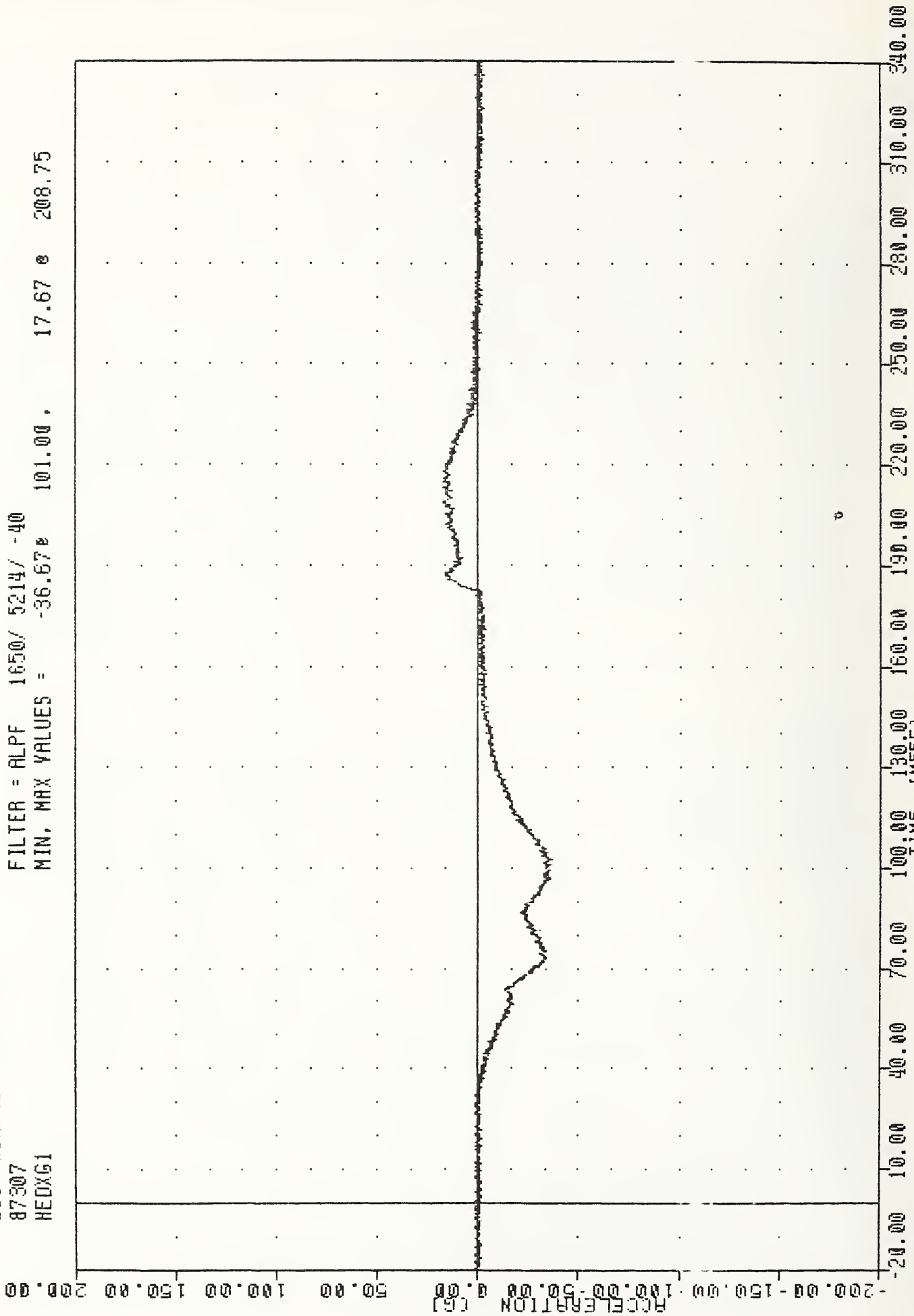
APPENDIX B

DATA PLOTS



TRC , 871103  
 209 FRONTAL CRASH TEST  
 87307  
 HEDXG1

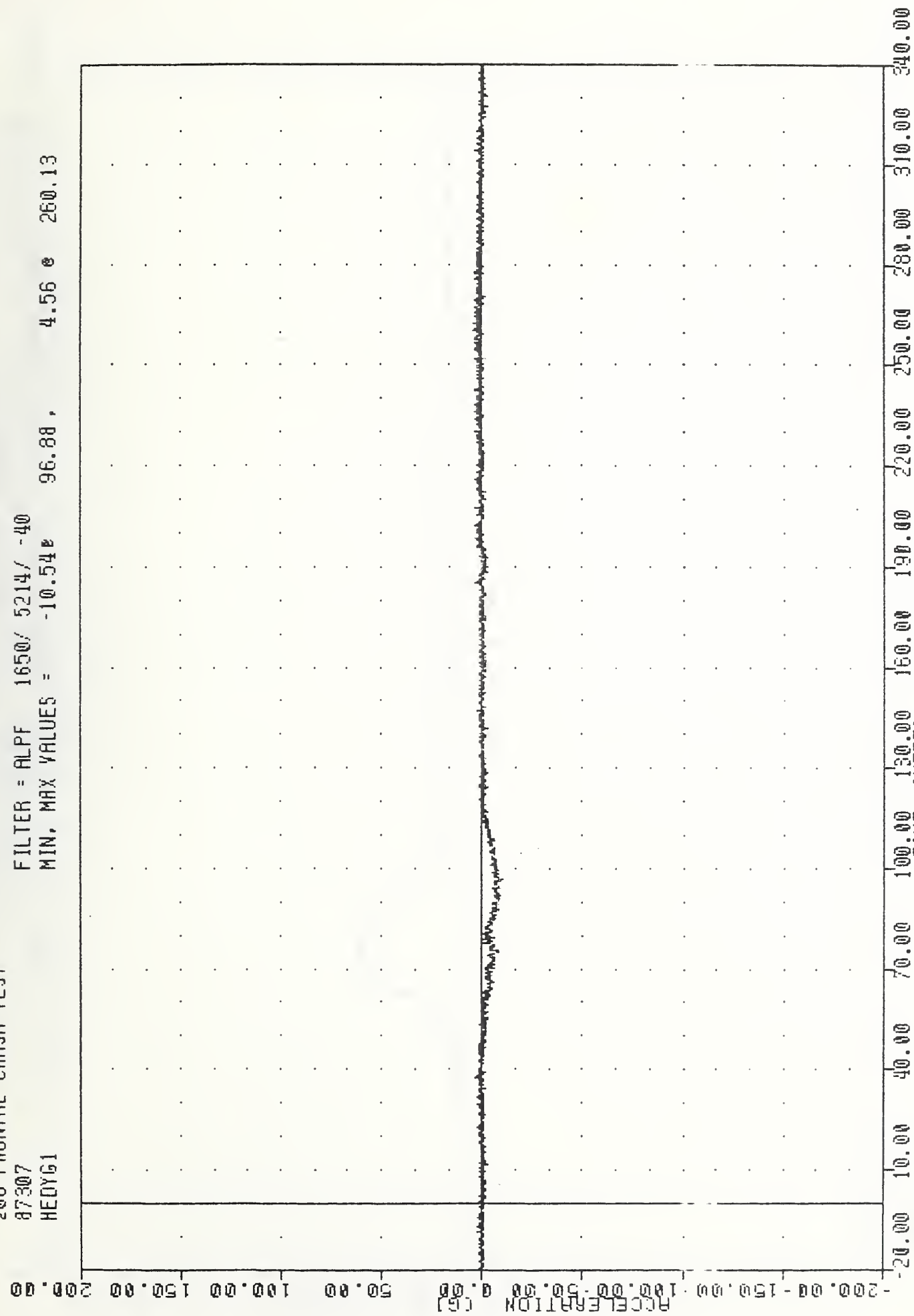
FILTER = ALPF 1650/ 5214/ -40  
 MIN, MAX VALUES = -36.67 101.00, 17.67 208.75



TOYOTA CAMRY INTO FRONTAL BARRIER  
 DRIVER HEAD X AXIS ACCELERATION

TRC .871103  
 208 FRONTAL CRASH TEST  
 87307  
 HEDYG1

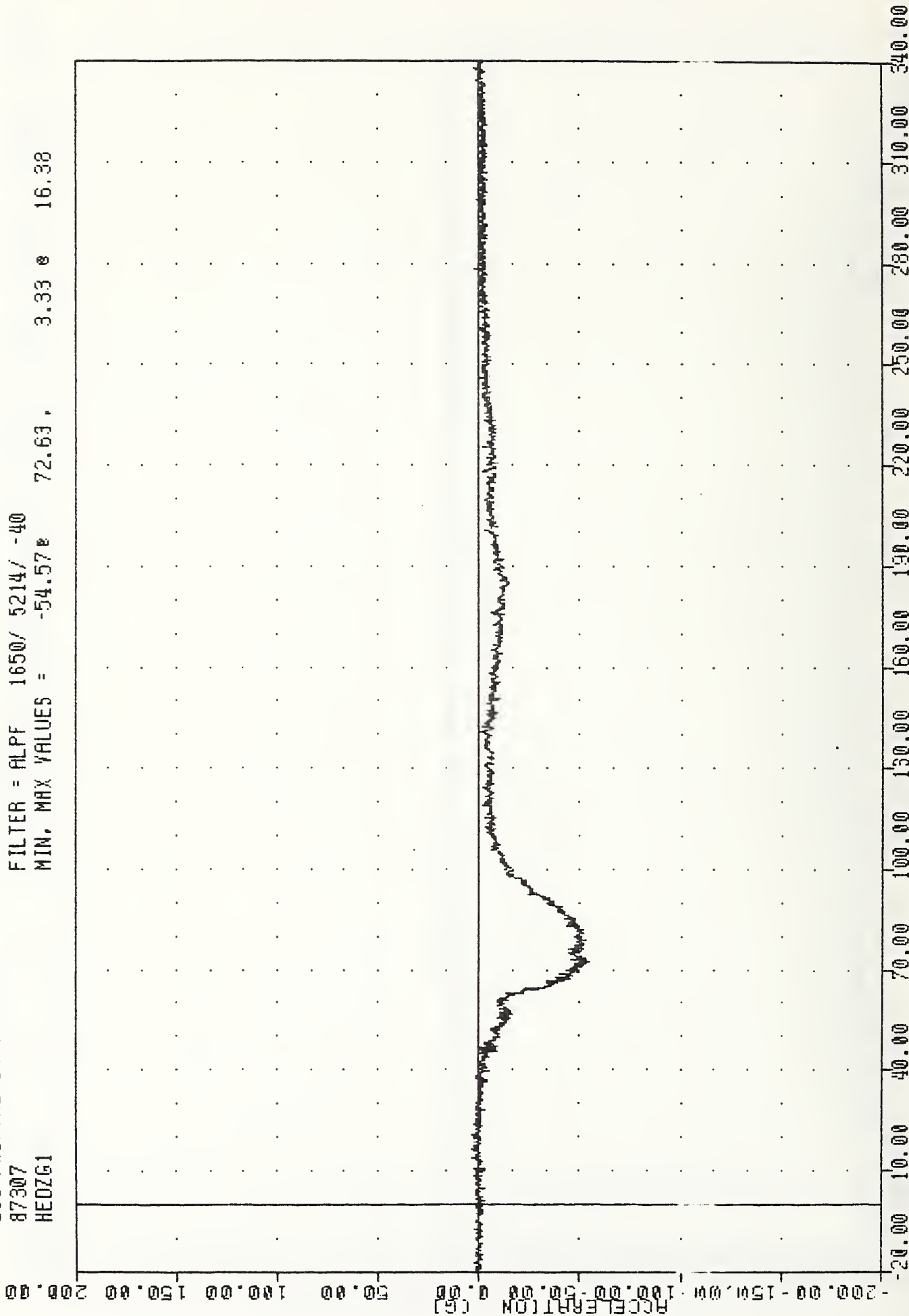
FILTER = ALPF 1650/ 5214/ -40  
 MIN, MAX VALUES = -10.54e 96.88, 4.56 e 260.13



TOYOTA CAMRY INTO FRONTAL BARRIER  
 DRIVER HEAD Y AXIS ACCELERATION

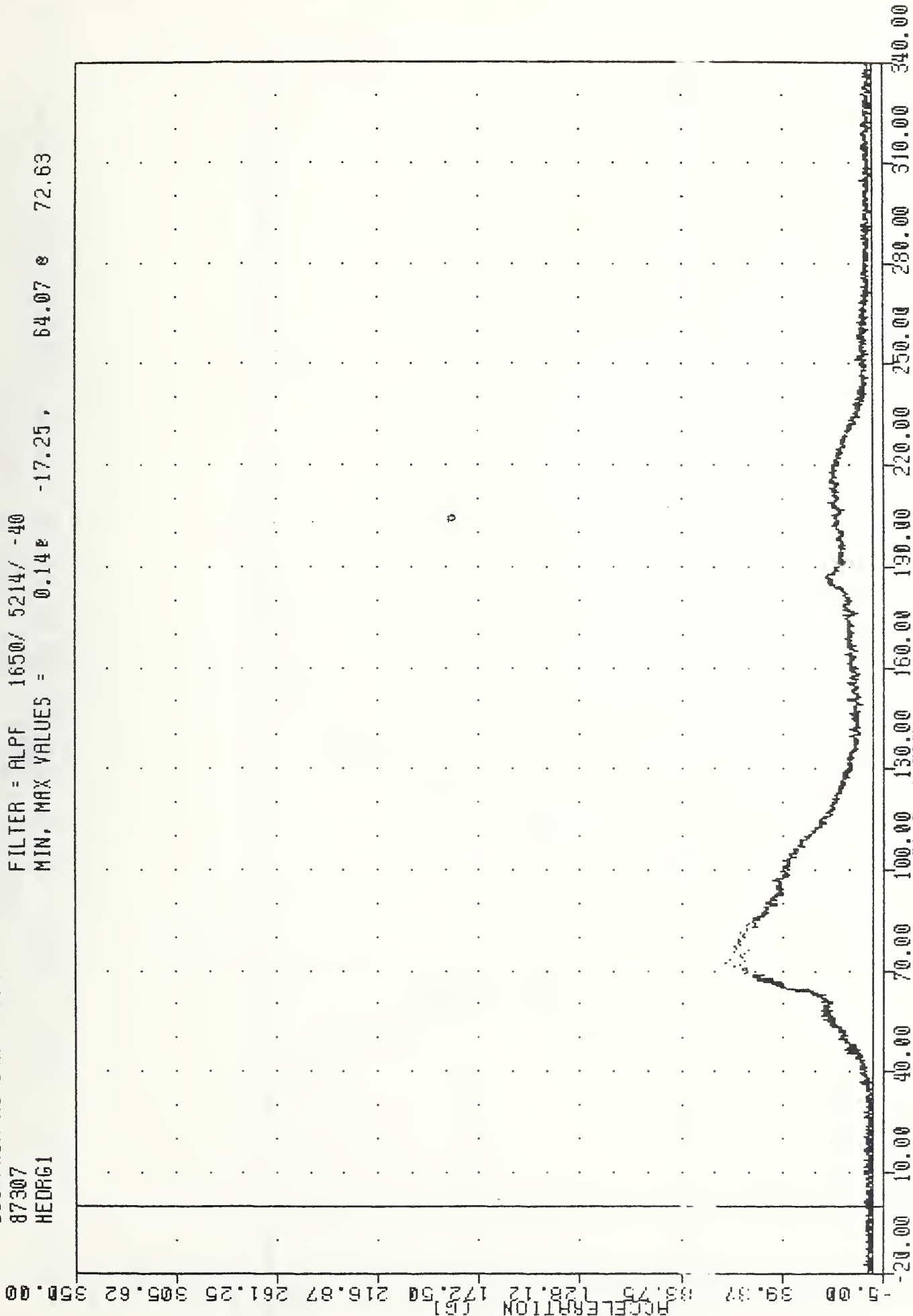
TRC , 871103  
 200 FRONTAL CRASH TEST  
 87307  
 HEDZG1

FILTER = ALPF 1650/ 5214/ -40  
 MIN. MAX VALUES = -54.57 72.63 , 3.33 16.38



TRC , 871103  
208 FRONTAL CRASH TEST  
87307  
HEDRG1

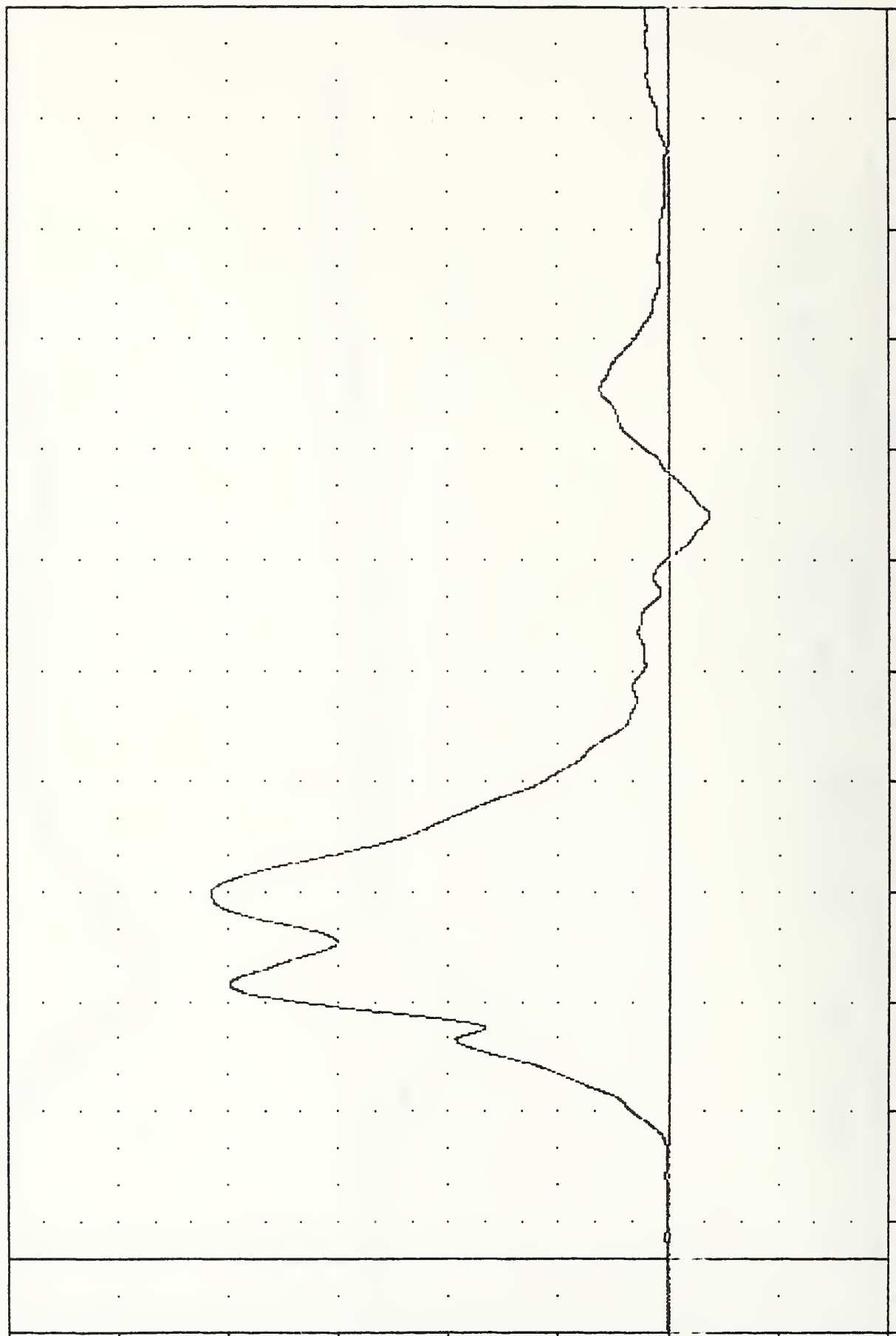
FILTER = ALPF 1650/ 5214/ -40  
MIN, MAX VALUES = 0.14e -17.25, 64.07 e 72.63



TRC .871103  
 200 FRONTAL CRASH TEST  
 87307  
 NEKXF1

FILTER = BLPP 100/ 250/ -16  
 MIN, MAX VALUES = -37.81 201.88, 414.38 99.88

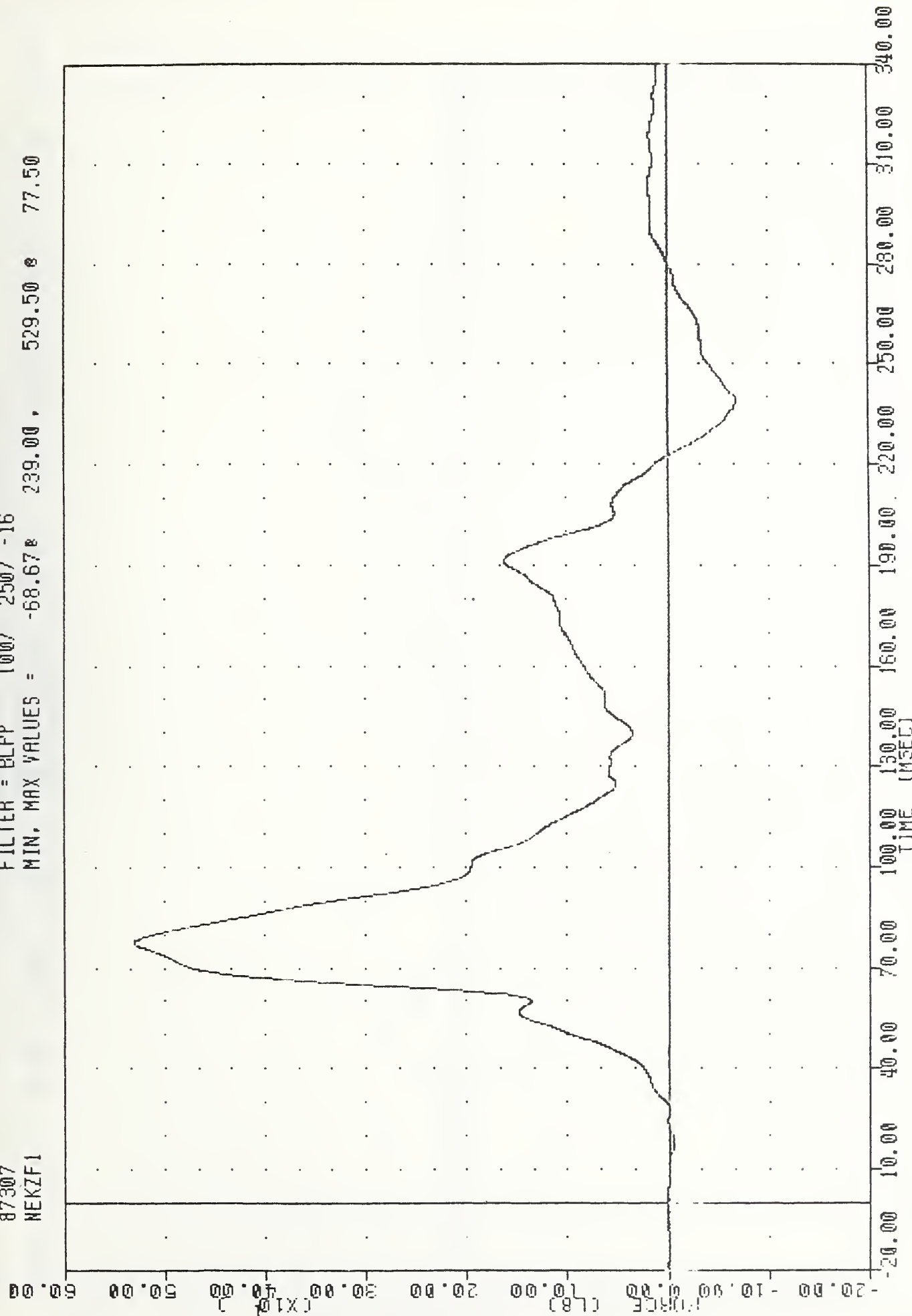
FORCE (LBS)  
 (X10<sup>3</sup>)



TOYOTA CAMRY INTO FRONTAL BARRIER  
 DRIVER NECK FORCE X AXIS LBS (SHEAR)

TRC , 871103  
 208 FRONTAL CRASH TEST  
 87307  
 NEKZF1

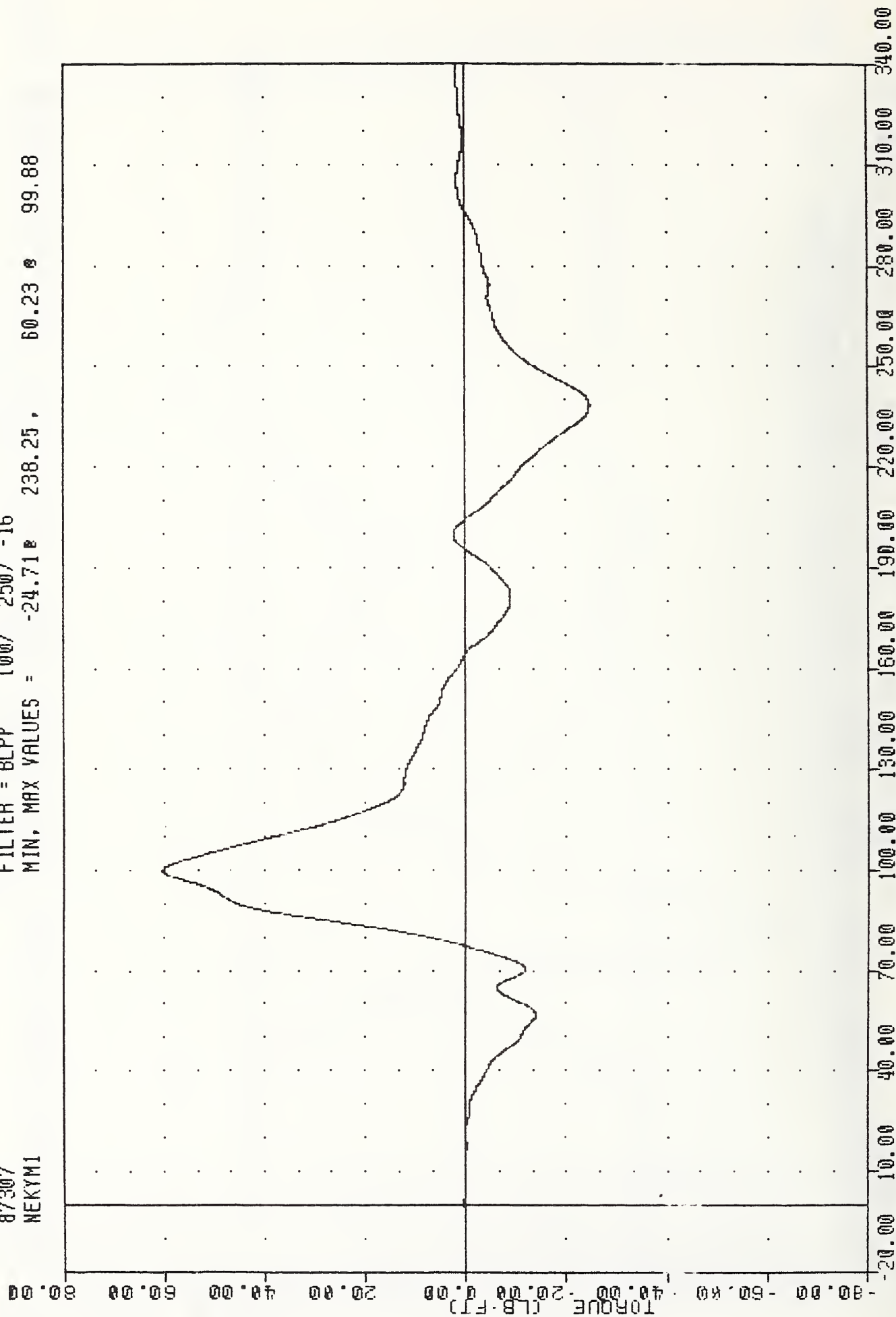
FILTER = BLPP 100/ 250/ -16  
 MIN. MAX VALUES = -68.67 239.00 529.50 77.50



TOYOTA CAMRY INTO FRONTAL BARRIER  
 DRIVER NECK FORCE Z AXIS LBS (AXIAL)

TRC , 871103  
 208 FRONTAL CRASH TEST  
 87307  
 NEKYM1

FILTER = BLPP 100/ 250/ -16  
 MIN, MAX VALUES = -24.718 238.25, 60.23 99.88

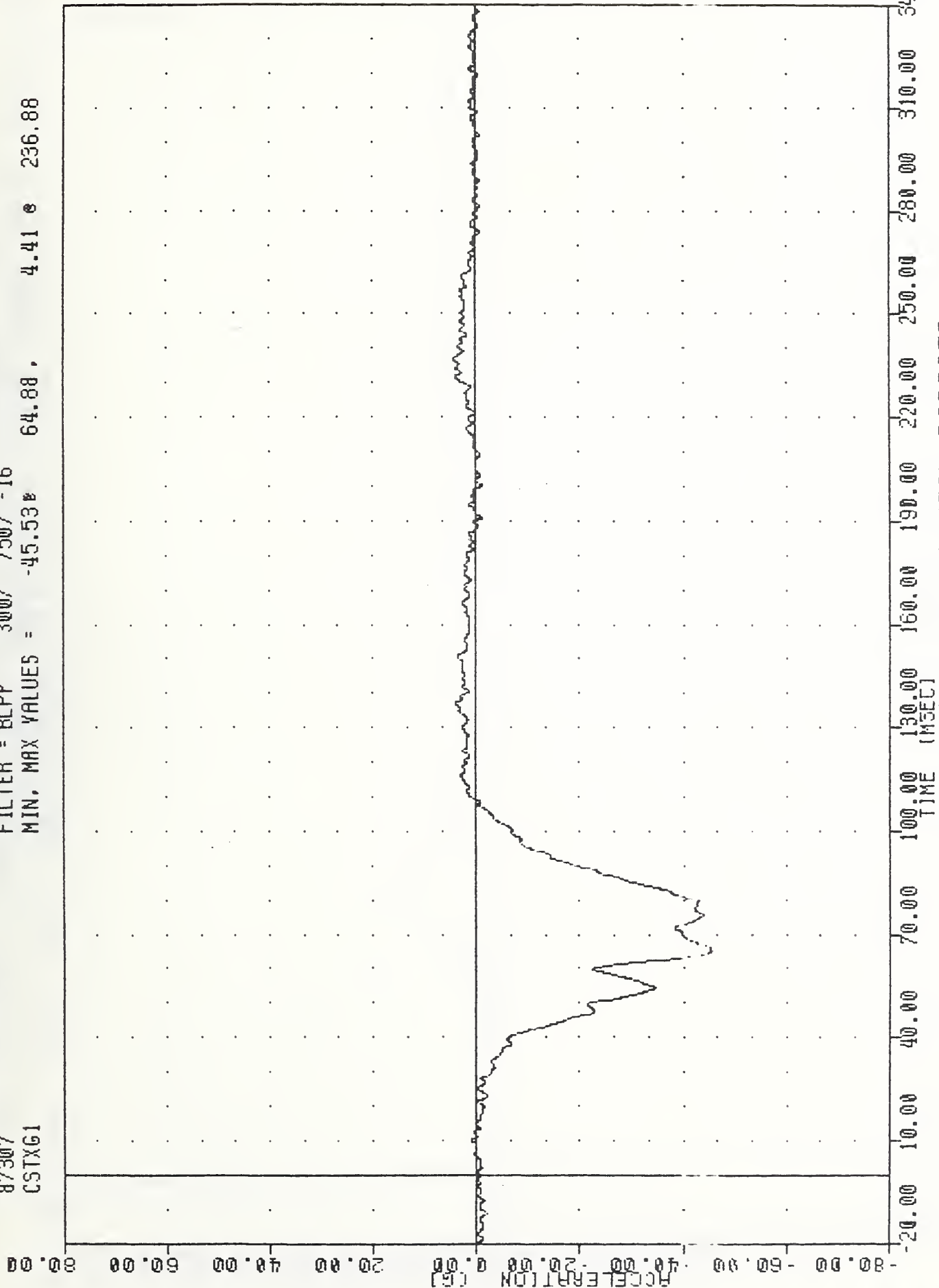


TOYOTA CAMRY INTO FRONTAL BARRIER  
 DRIVER NECK MOMENT Y AXIS FT-LBS



IRC : , 871103  
 200 FRONTAL CRASH TEST  
 87307  
 CSTXG1

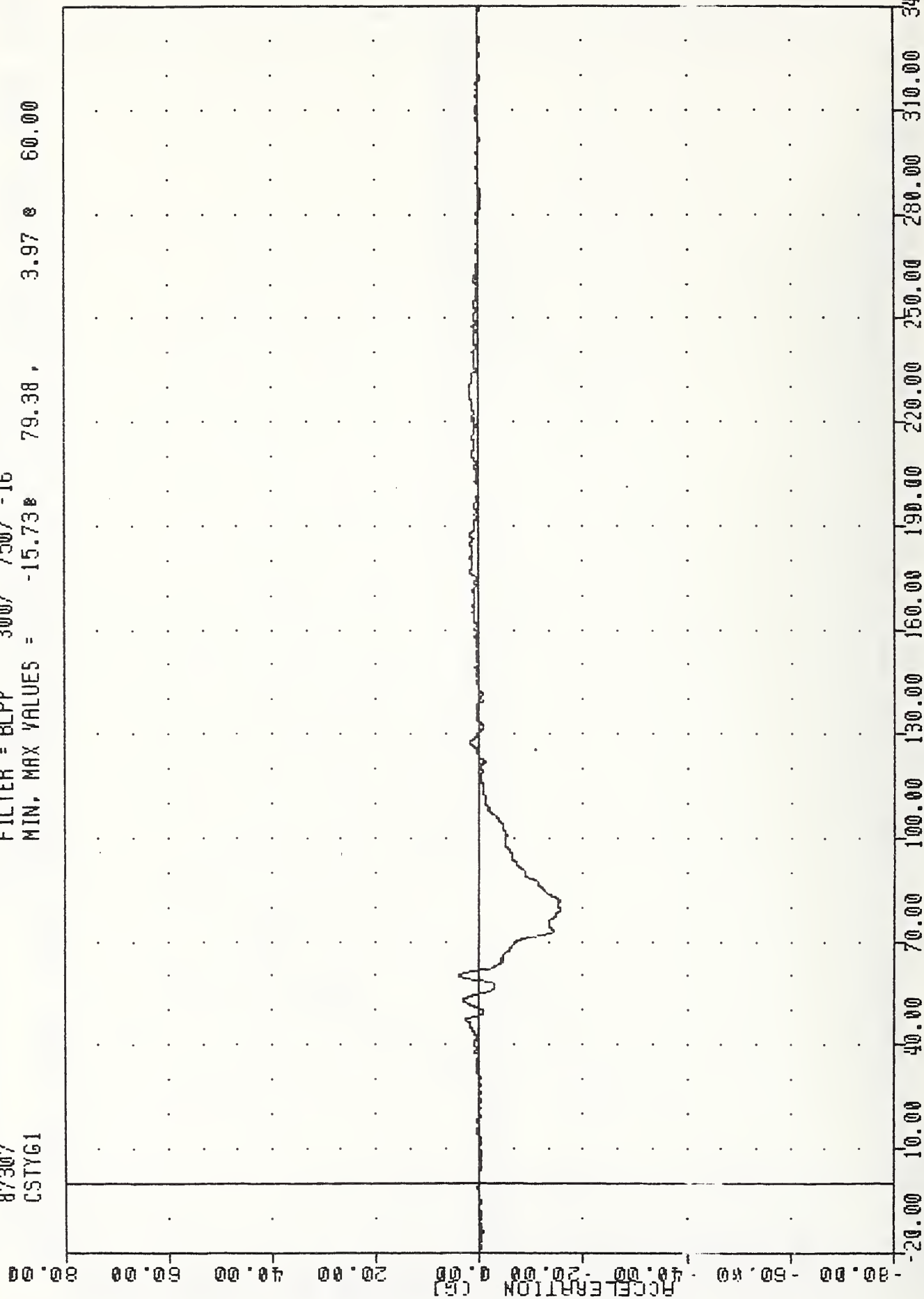
FILTER = BLPP 300/ 750/ -16  
 MIN, MAX VALUES = -45.53% 64.88, 4.41 @ 236.88



TOYOTA CAMRY INTO FRONTAL BARRIER  
 DRIVER CHEST X AXIS ACCELERATION

TRC , 871103  
 208 FRONTAL CRASH TEST  
 87307  
 CSTYG1

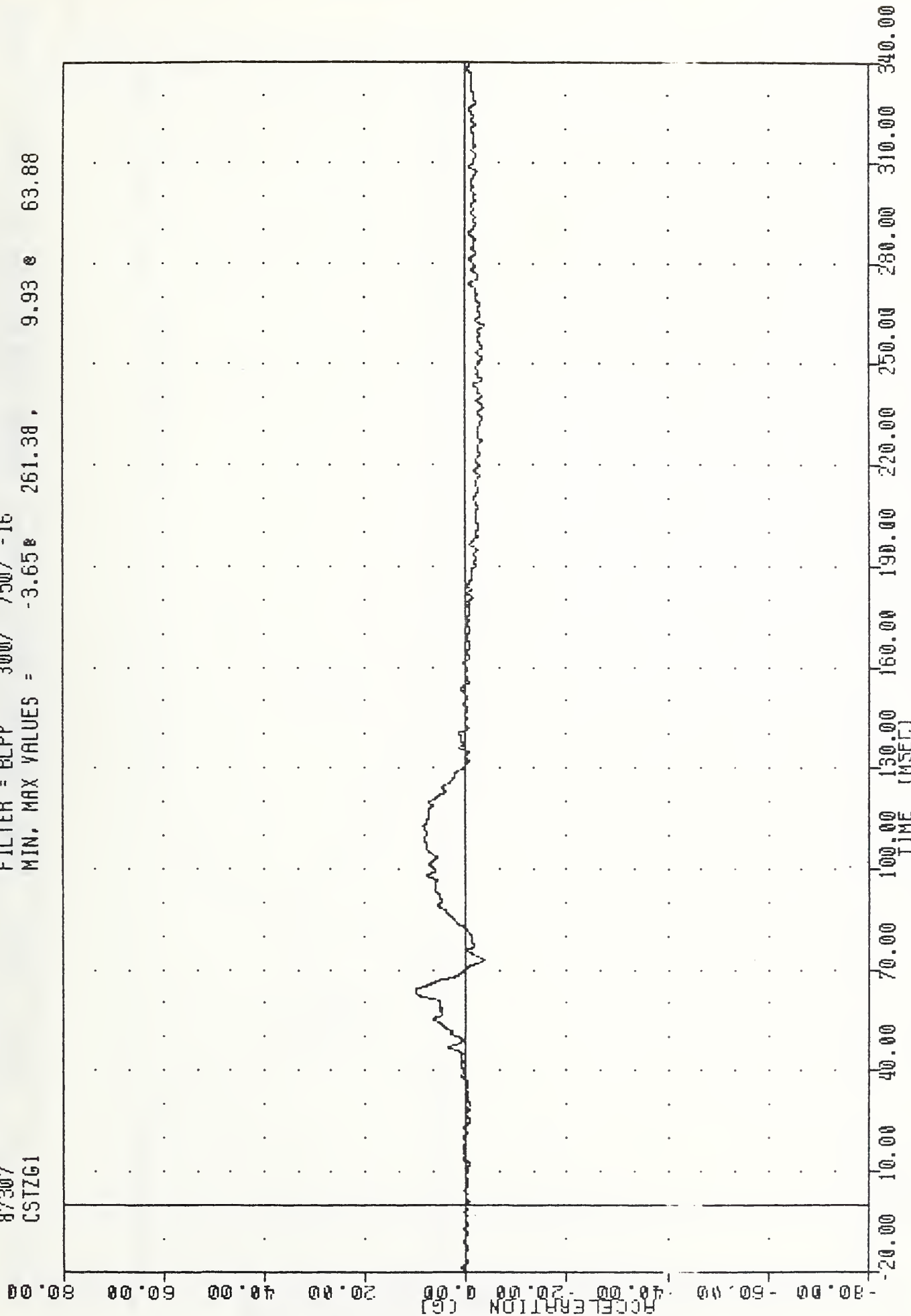
FILTER = BLPP 300/ 750/ -16  
 MIN. MAX VALUES = -15.73 79.38 , 3.97 60.00



TOYOTA CAMRY INTO FRONTAL BARRIER  
 DRIVER CHEST Y AXIS ACCELERATION

TRC , 871103  
 200 FRONTAL CRASH TEST  
 87307  
 CSTZG1

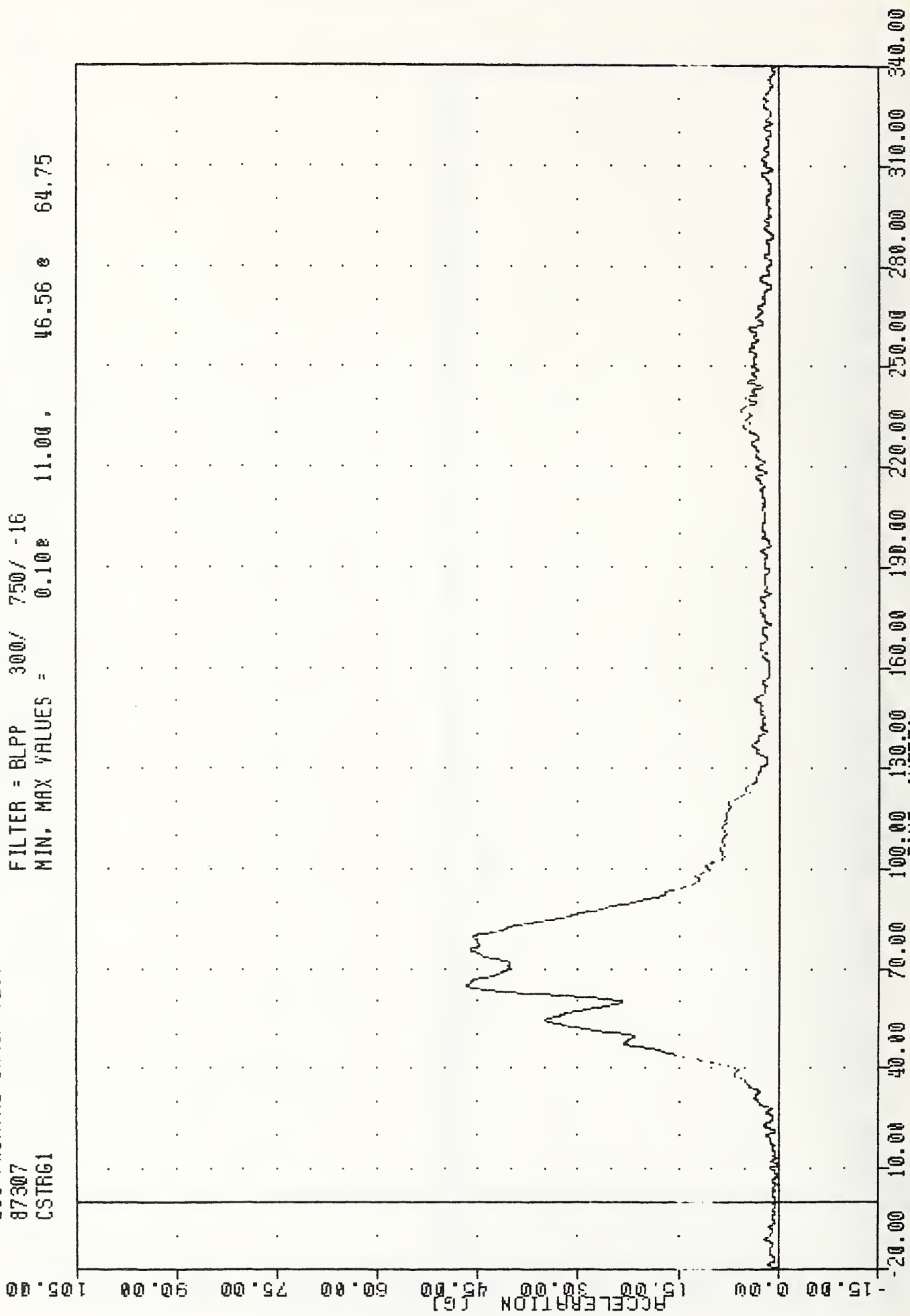
FILTER = BLPP 300/ 750/ -16  
 MIN, MAX VALUES = -3.65 261.38, 9.93 63.88



TOYOTA CAMRY INTO FRONTAL BARRIER  
 DRIVER CHEST Z AXIS ACCELERATION

TRC , 871103  
 200 FRONTAL CRASH TEST  
 87307  
 CSTRG1

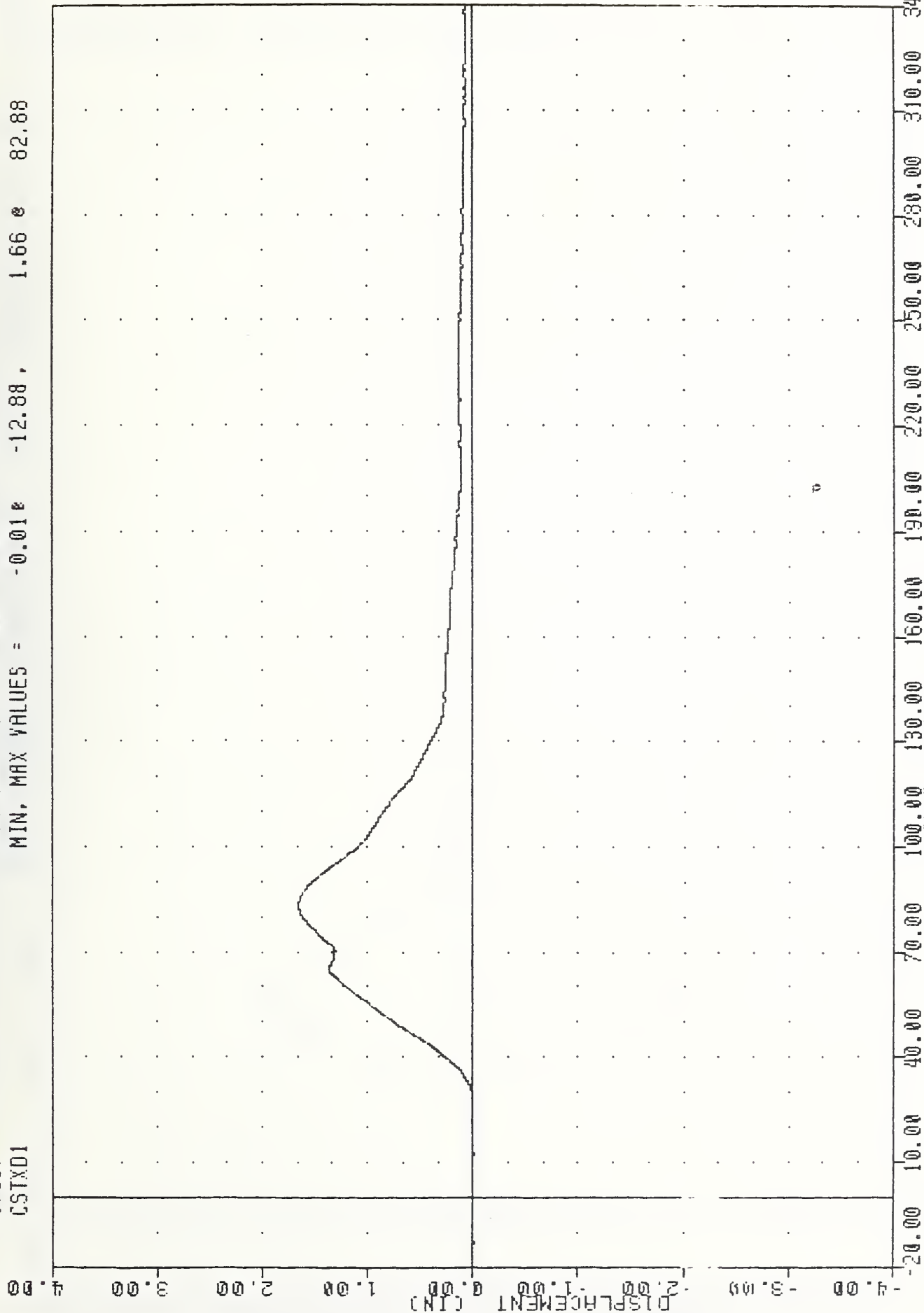
FILTER = BLPP 300/ 750/ -16  
 MIN. MAX VALUES = 0.10e 11.00, 46.56 e 64.75



TOYOTA CAMRY INTO FRONTAL BARRIER  
 DRIVER CHEST RESULTANT ACCELERATION

TRC , 871103  
 208 FRONTAL CRASH TEST  
 87307  
 CSTXD1

FILTER = BLPP 300/ 750/ -16  
 MIN, MAX VALUES = -0.018 -12.88 , 1.66 82.88

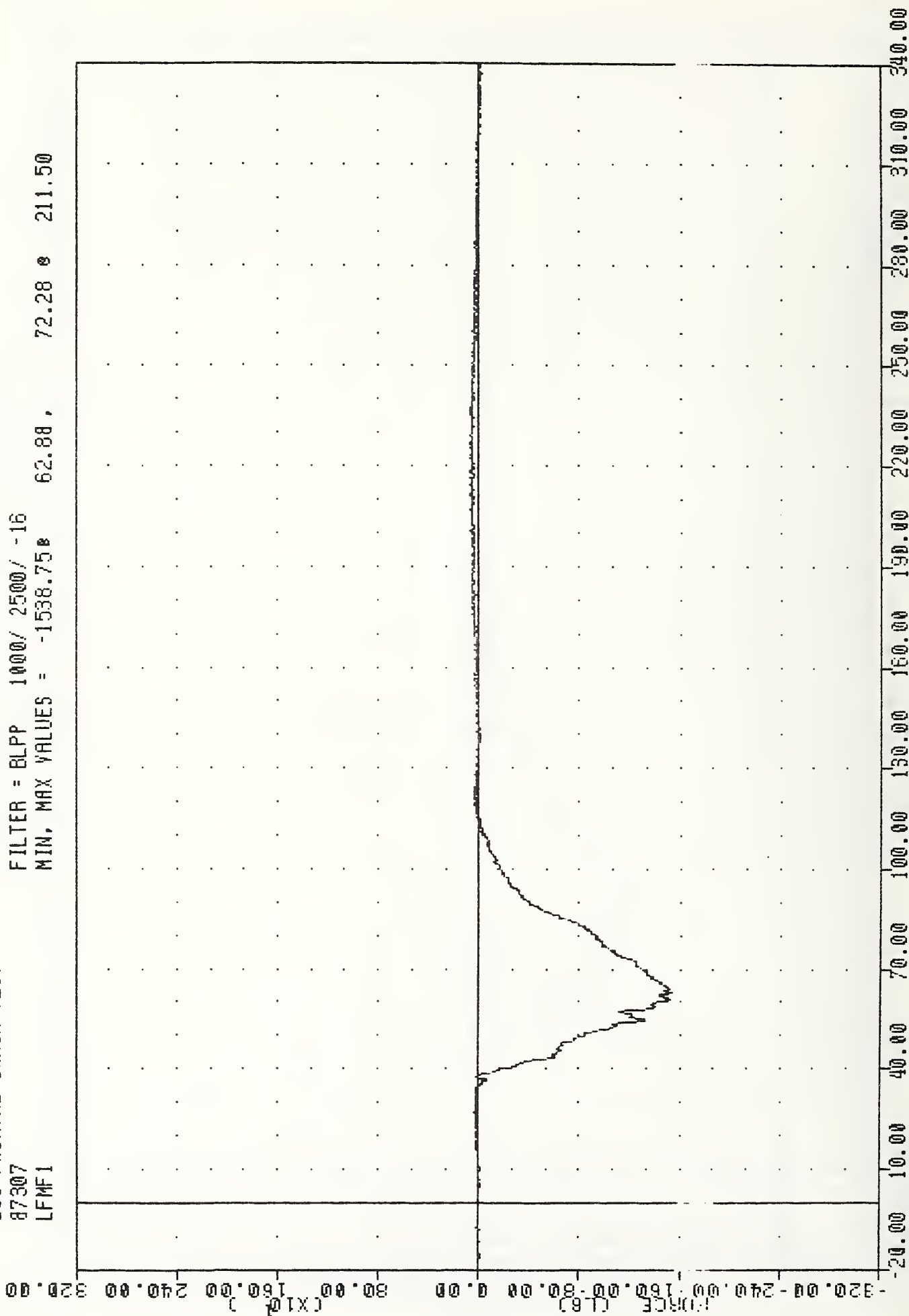


TOYOTA CAMRY INTO FRONTAL BARRIER  
 DRIVER CHEST DISPLACEMENT INCHES



TRC , 871103  
 200 FRONTAL CRASH TEST  
 87307  
 LFMF1

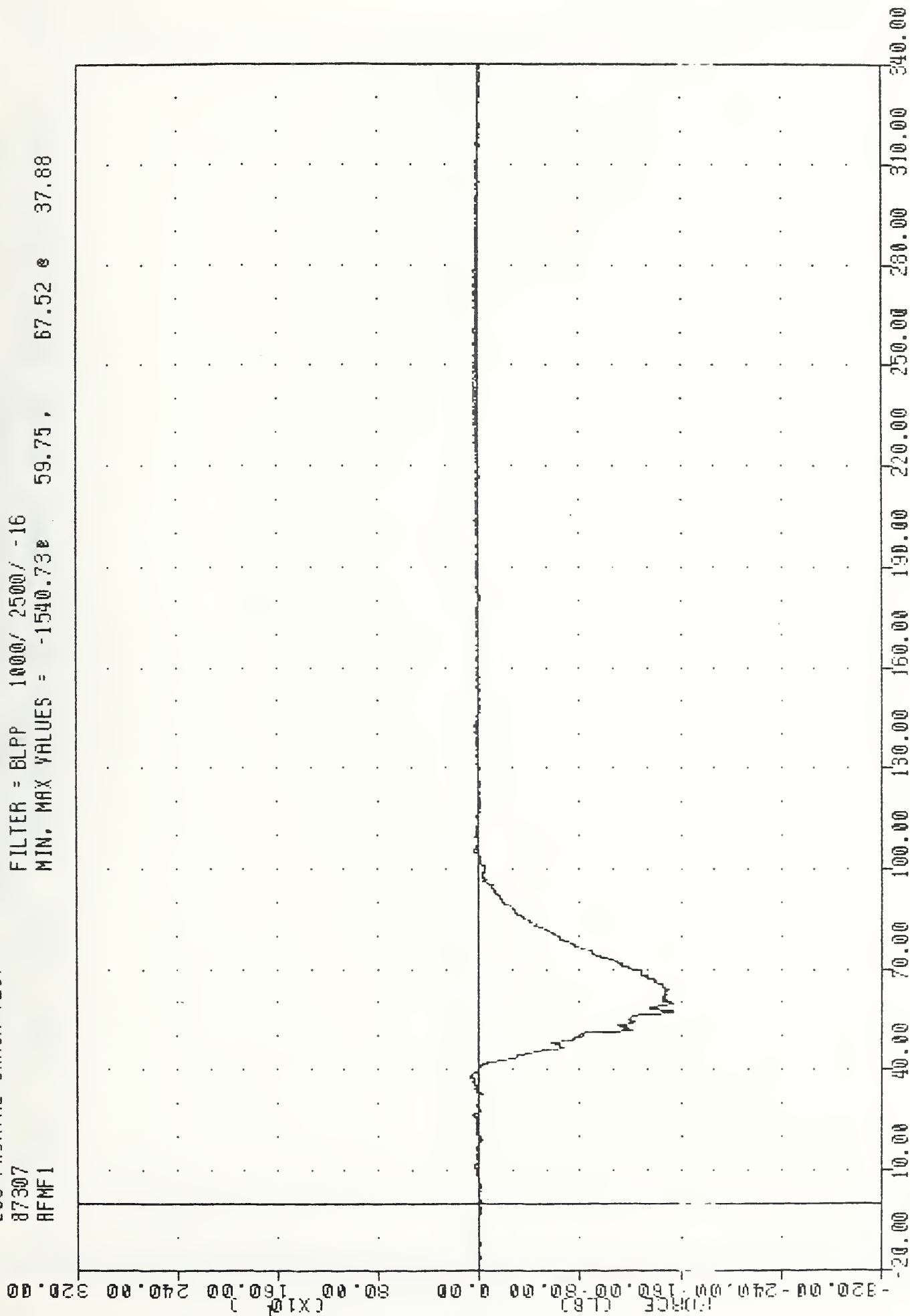
FILTER = BLPP 1000/ 2500/ -16  
 MIN, MAX VALUES = -1538.750 62.88, 72.28 211.50



TOYOTA CAMRY INTO FRONTAL BARRIER  
 DRIVER LEFT FEMUR FORCE LBS

TRC , 871103  
 200 FRONTAL CRASH TEST  
 87307  
 AFMF1

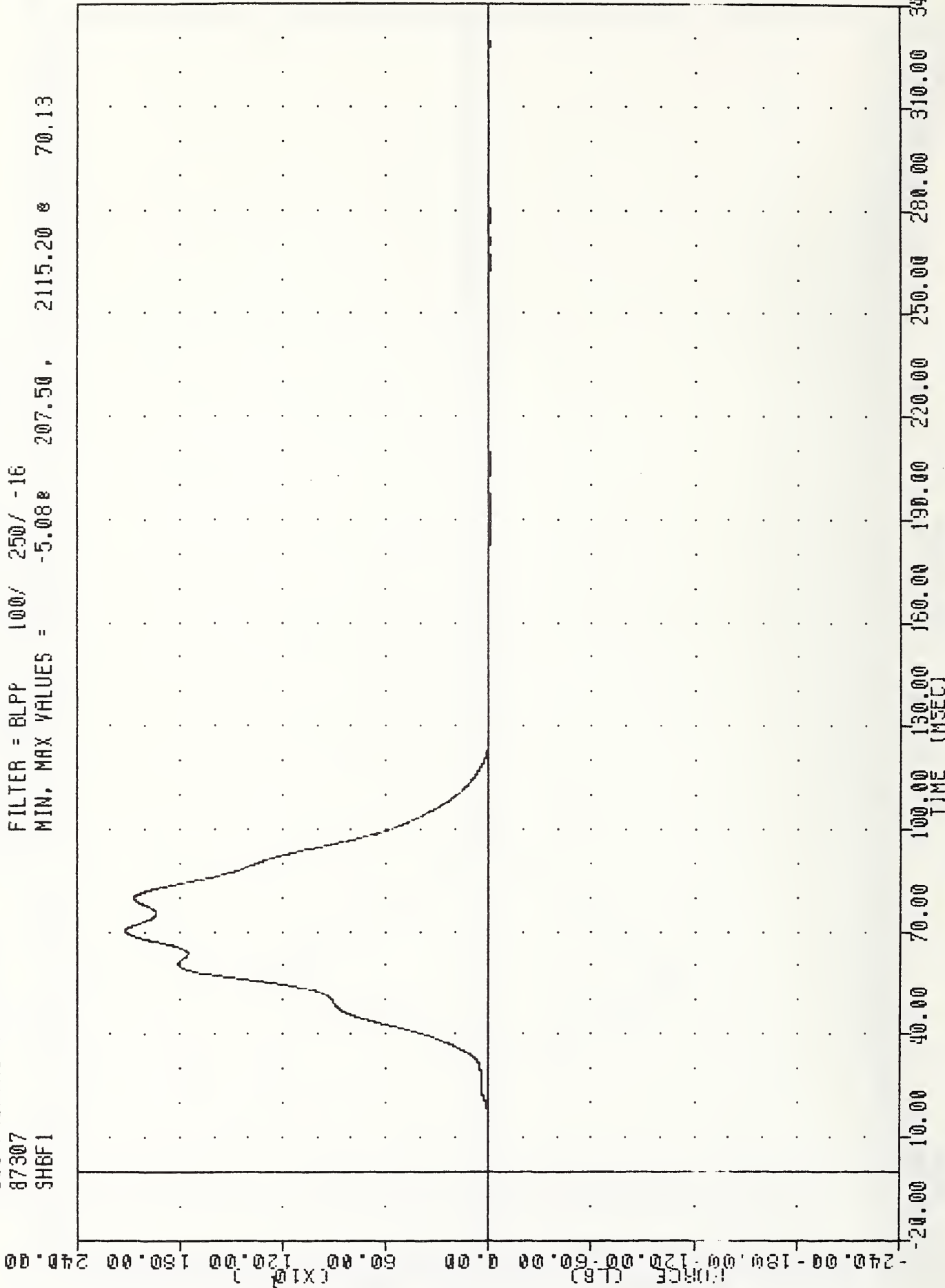
FILTER = BLPP 1000/ 2500/ -16  
 MIN, MAX VALUES = -1540.730 59.75, 67.52 37.88



TOYOTA CAMRY INTO FRONTAL BARRIER  
 DRIVER RIGHT FEMUR FORCE LBS

TRC , 871103  
 200 FRONTAL CRASH TEST  
 87307  
 SHBF1

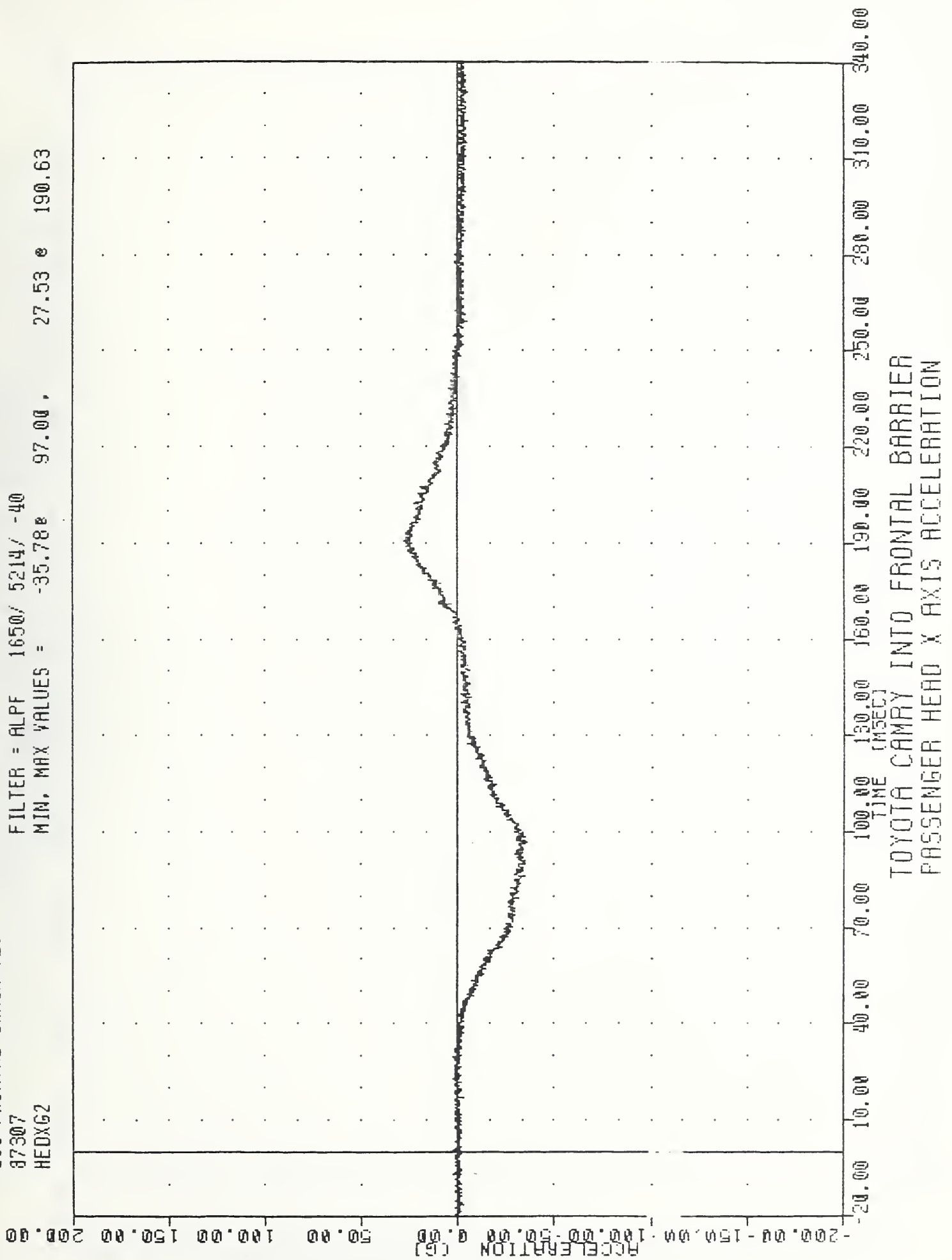
FILTER = BLPP 100/ 250/ -16  
 MIN. MAX VALUES = -5.08 207.50 , 2115.20 70.13



TOYOTA CAMRY INTO FRONTAL BARRIER  
 DRIVER'S PASSIVE BELT INBOARD FORCE LBS

TRC , 871103  
 209 FRONTAL CRASH TEST  
 87307  
 HEDX62

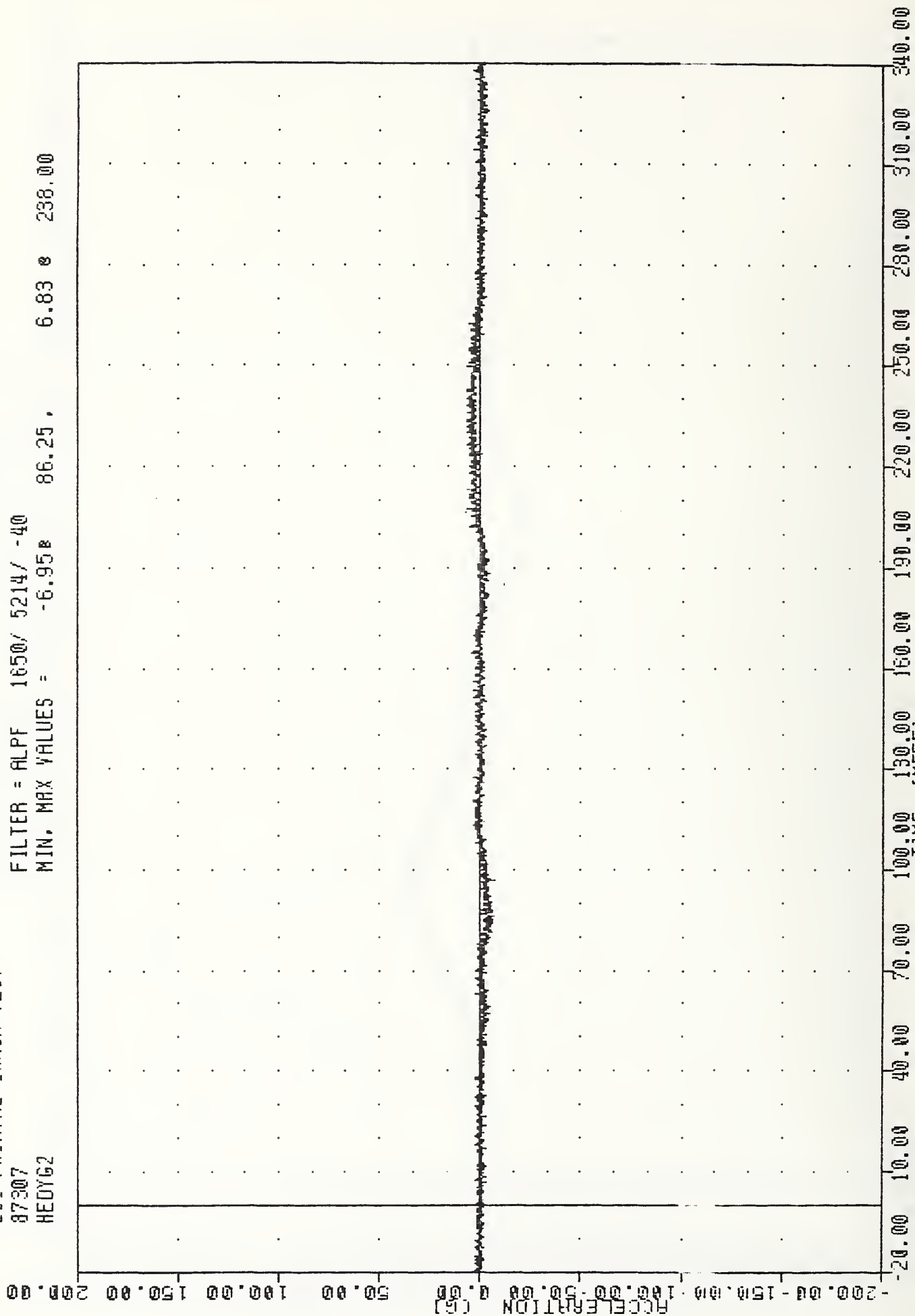
FILTER = ALPF 1650/ 5214/ -40  
 MIN, MAX VALUES = -35.78 97.00 , 27.53 190.63



TOYOTA CAMRY INTO FRONTAL BARRIER  
 PASSENGER HEAD X AXIS ACCELERATION

IRC , 871103  
 209 FRONTAL CRASH TEST  
 87307  
 HEDYG2

FILTER = ALPF 1650/ 5214/ -40  
 MIN. MAX VALUES = -6.95 86.25 , 6.83 238.00

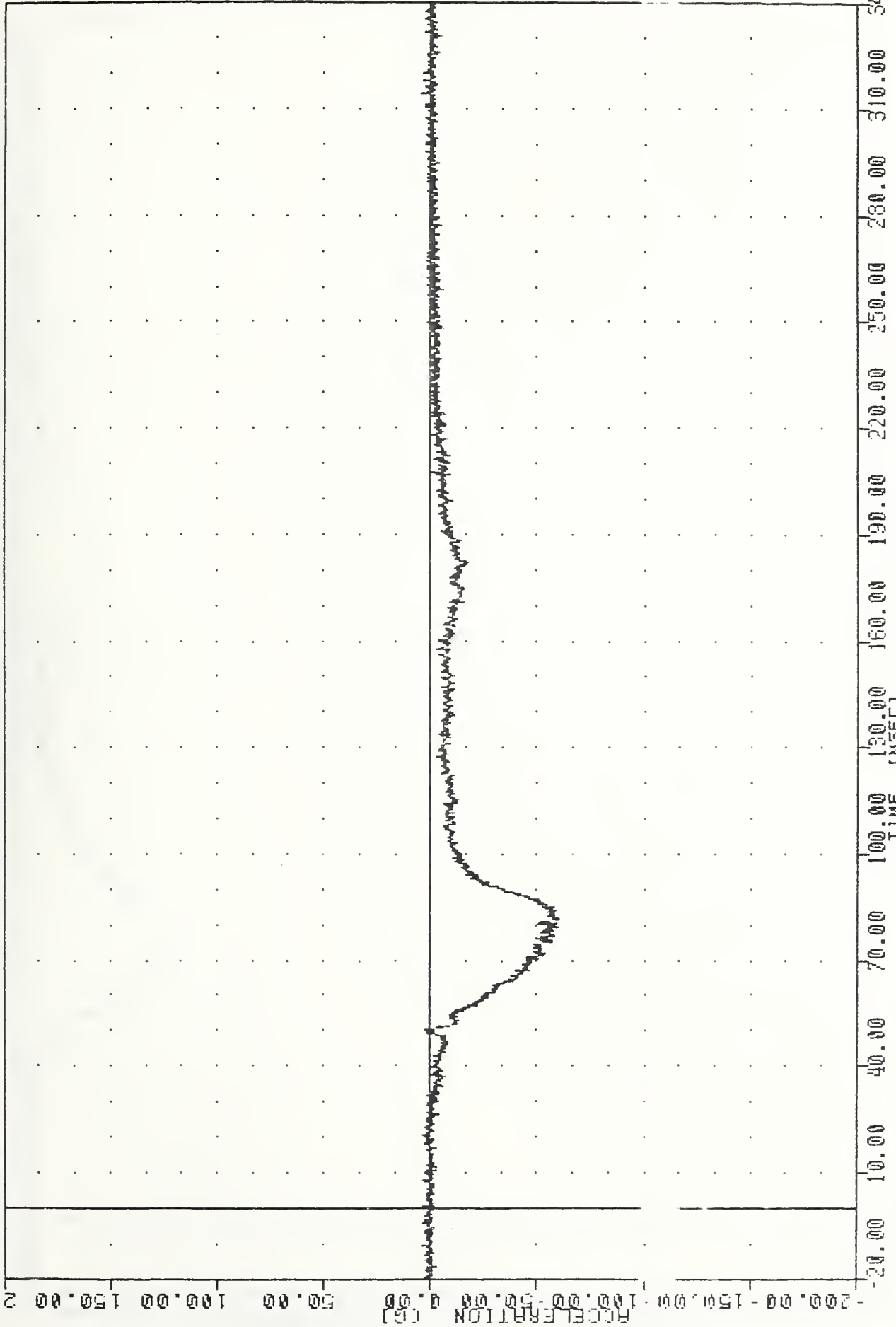


TOYOTA CAMRY INTO FRONTAL BARRIER  
 PASSENGER HEAD Y AXIS ACCELERATION



TRC , 871103  
 208 FRONTAL CRASH TEST  
 87307  
 HEDZ62

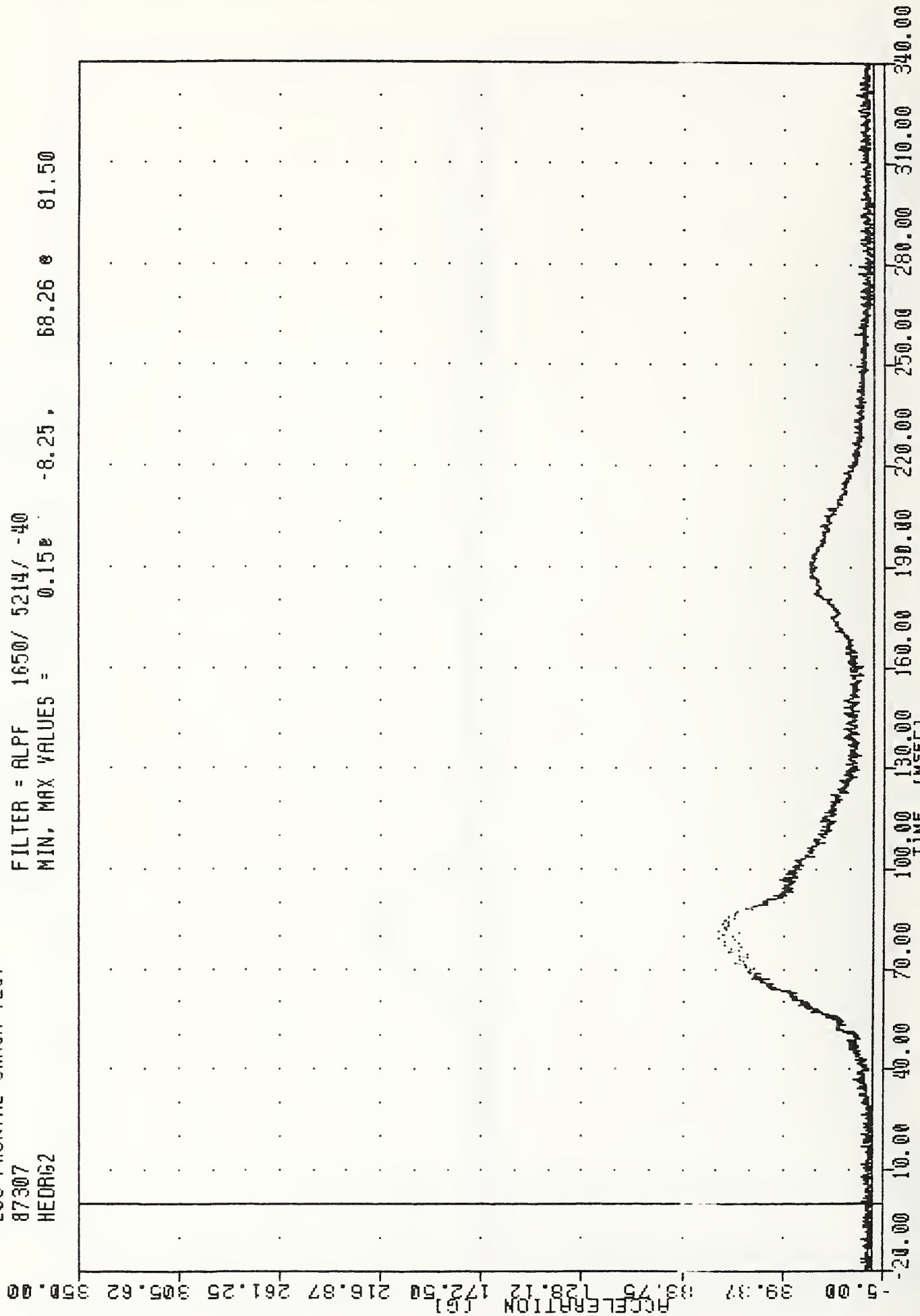
FILTER = ALPF 1650/ 5214/ -40  
 MIN. MAX VALUES = -60.298 81.50 , 4.87 314.25



TOYOTA CAMRY INTO FRONTAL BARRIER  
 PASSENGER HEAD Z AXIS ACCELERATION

TRC , 871103  
 200 FRONTAL CRASH TEST  
 87307  
 HEADG2

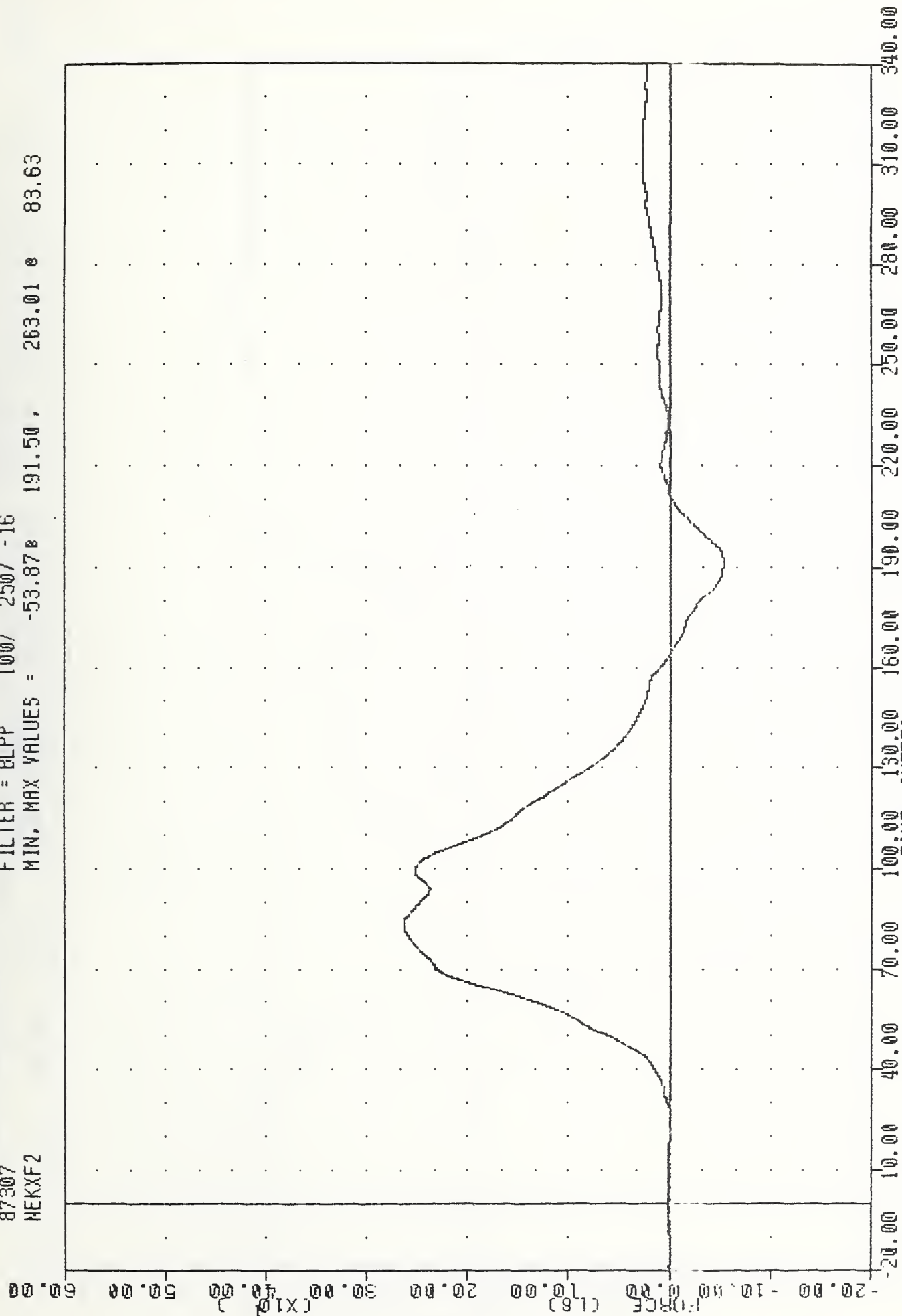
FILTER = ALPF 1650/ 5214/ -40  
 MIN, MAX VALUES = 0.150 -8.25, 68.26 81.50



TOYOTA CAMRY INTO FRONTAL BARRIER  
 PASSENGER HEAD RESULTANT ACCELERATION

TRC , 871103  
 208 FRONTAL CRASH TEST  
 87307  
 HEKXF2

FILTER = BLPP 100/ 250/ -16  
 MIN, MAX VALUES = -53.87 191.50 , 263.01 83.63

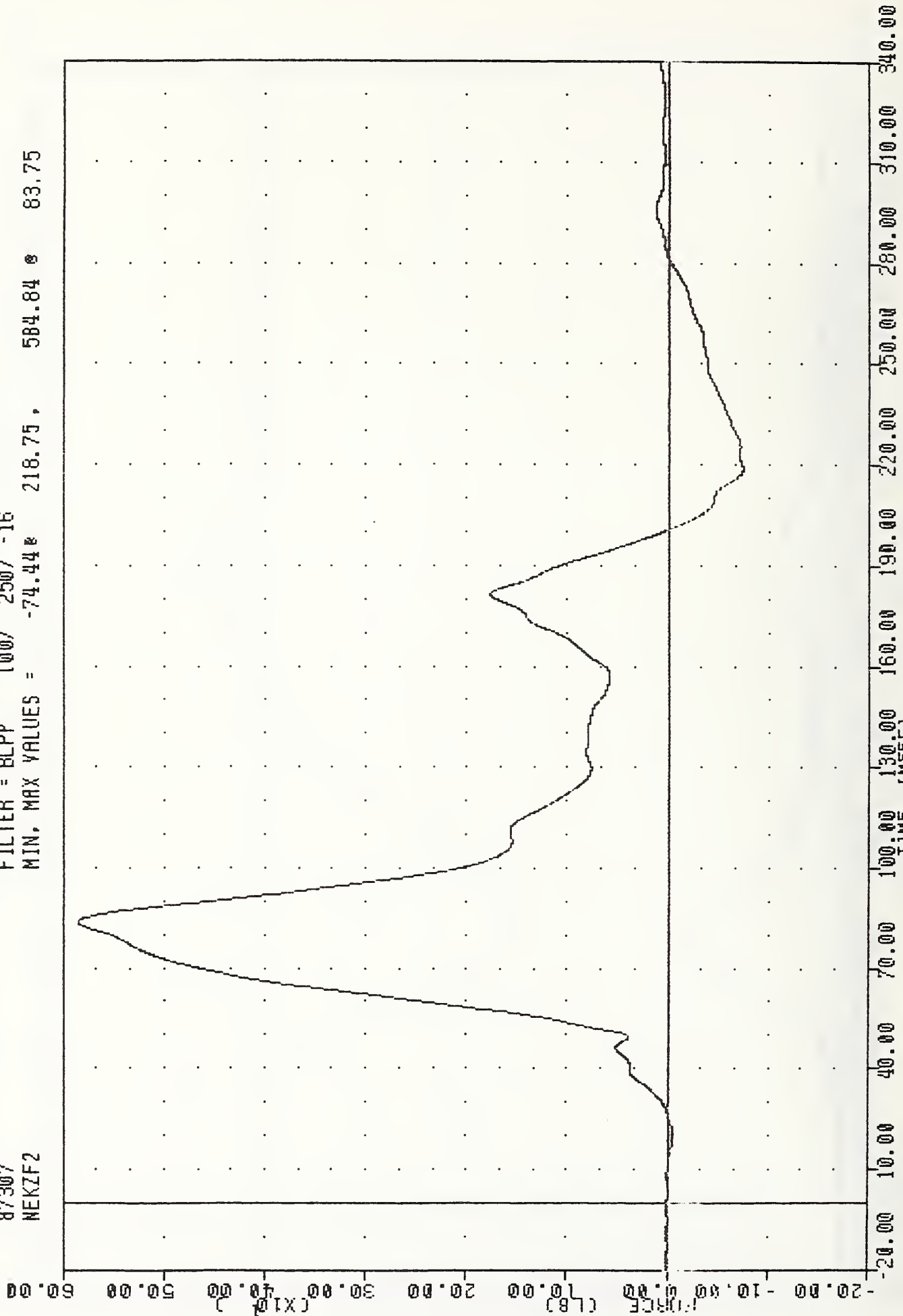


TOYOTA CAMRY INTO FRONTAL BARRIER  
 PASSENGER NECK FORCE X AXIS LBS (SHEAR)



TRC , 871103  
 209 FRONTAL CRASH TEST  
 87307  
 NEKZF2

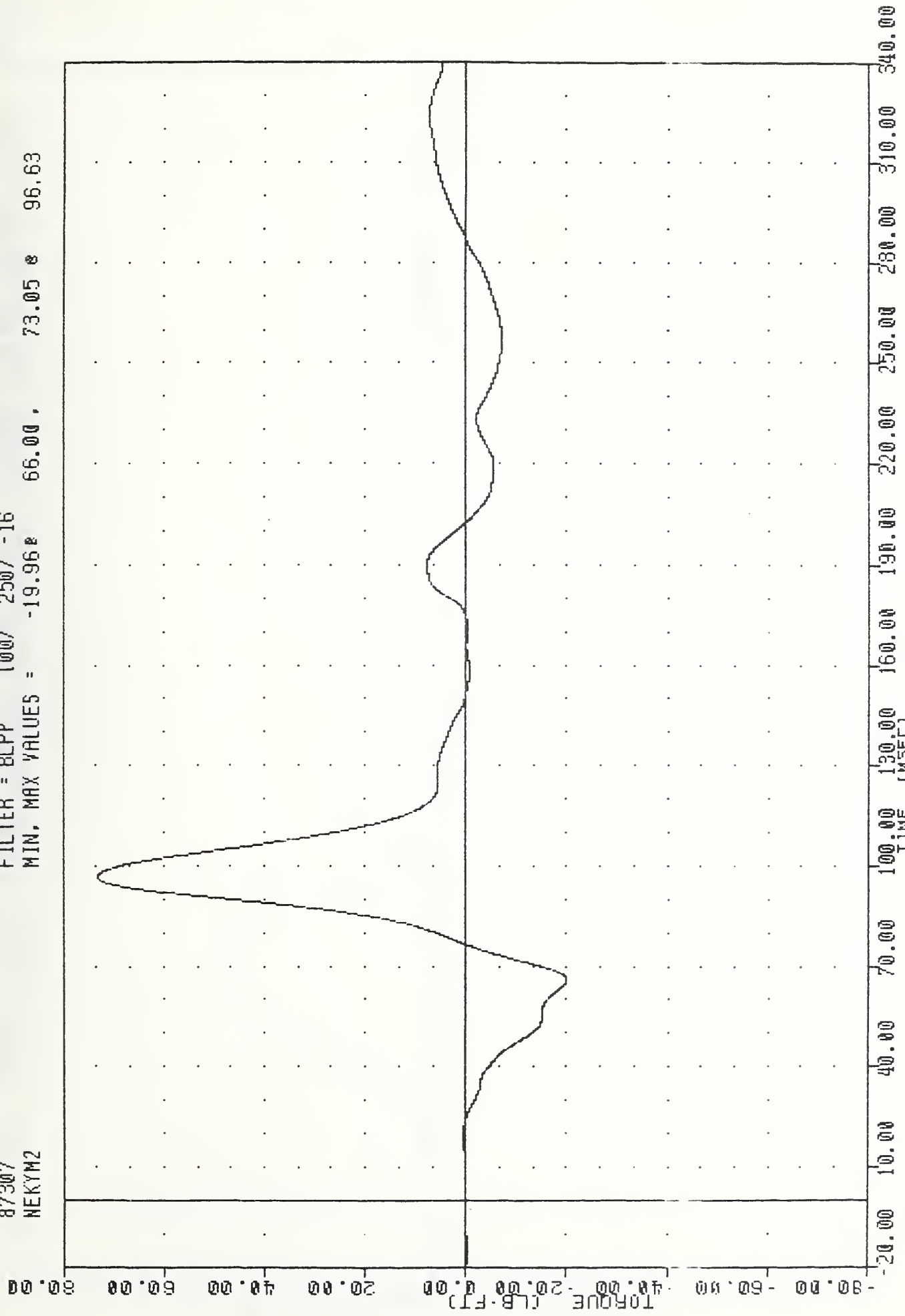
FILTER = BLPP 100/ 250/ -16  
 MIN. MAX VALUES = -74.44 584.84 83.75



TOYOTA CAMRY INTO FRONTAL BARRIER  
 PASSENGER NECK FORCE Z AXIS LBS (AXIAL)

TRC , 871103  
 200 FRONTAL CRASH TEST  
 87307  
 NEKYM2

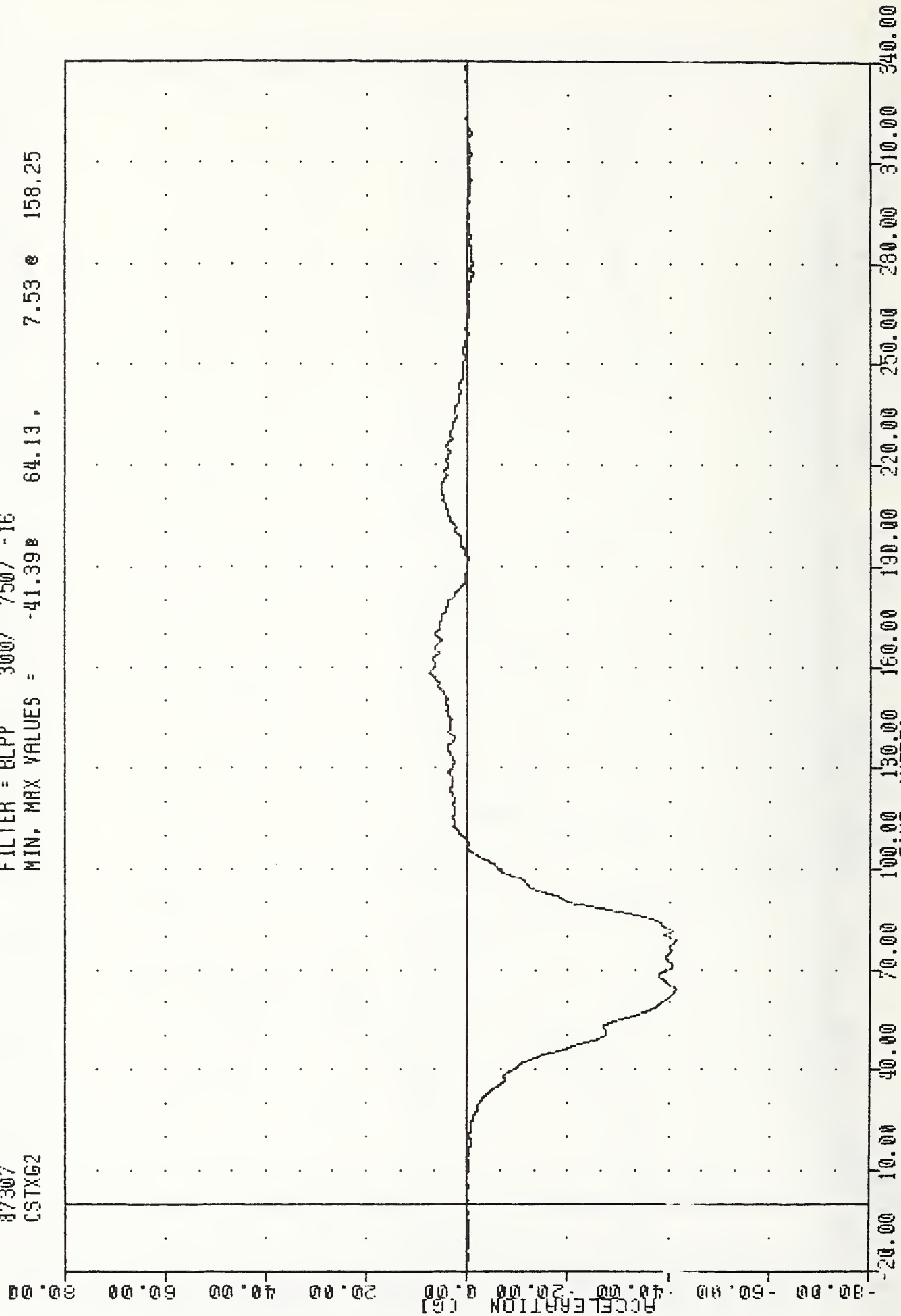
FILTER = BLPP 100/ 250/ -16  
 MIN, MAX VALUES = -19.96 66.00 , 73.05 96.63



TOYOTA CAMRY INTO FRONTAL BARRIER  
 PASSENGER NECK MOMENT Y AXIS FT-LBS

TRC , 871103  
 208 FRONTAL CRASH TEST  
 87307  
 CSTXG2

FILTER = BLPP 300/ 750/ -16  
 MIN. MAX VALUES = -41.39 64.13 , 7.53 158.25



TOYOTA CAMRY INTO FRONTAL BARRIER  
 PASSENGER CHEST X AXIS ACCELERATION



TRC , 871103

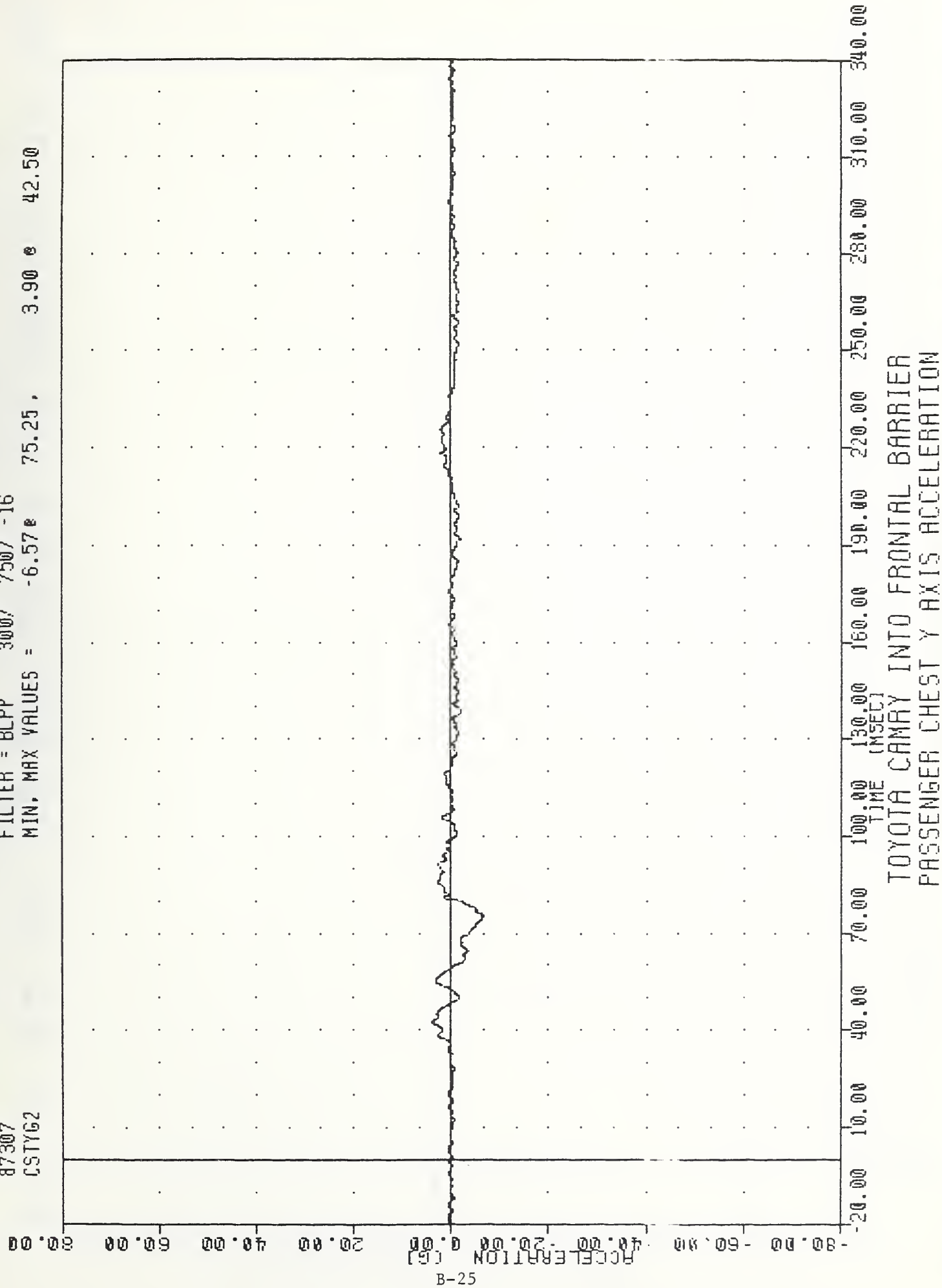
2008 FRONTAL CRASH TEST

87307

CSTYG2

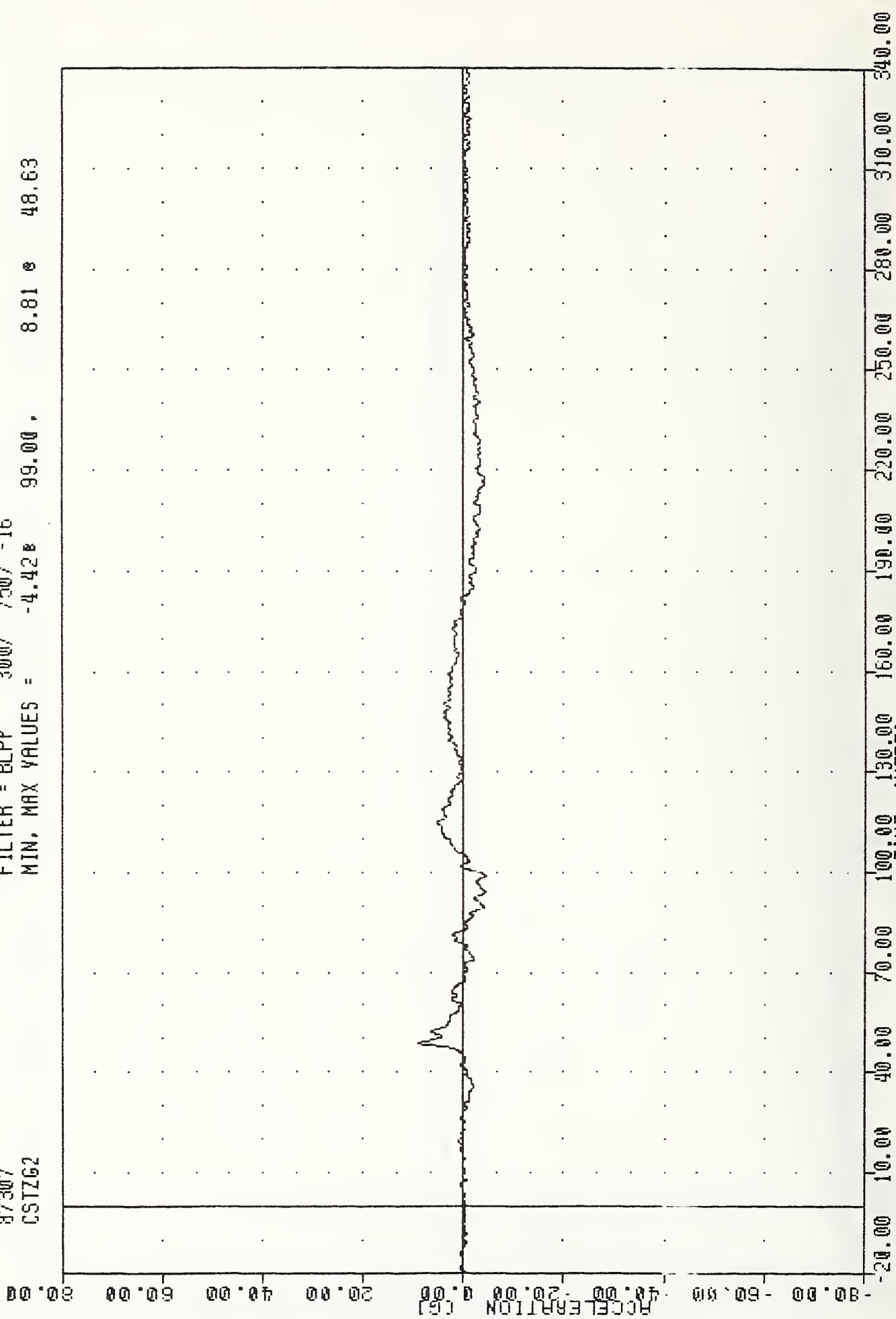
FILTER = BLPP 300/ 750/ -16

MIN. MAX VALUES = -6.57e 75.25, 3.90 e 42.50



TRC .871103  
 200 FRONTAL CRASH TEST  
 873007  
 CSTZG2

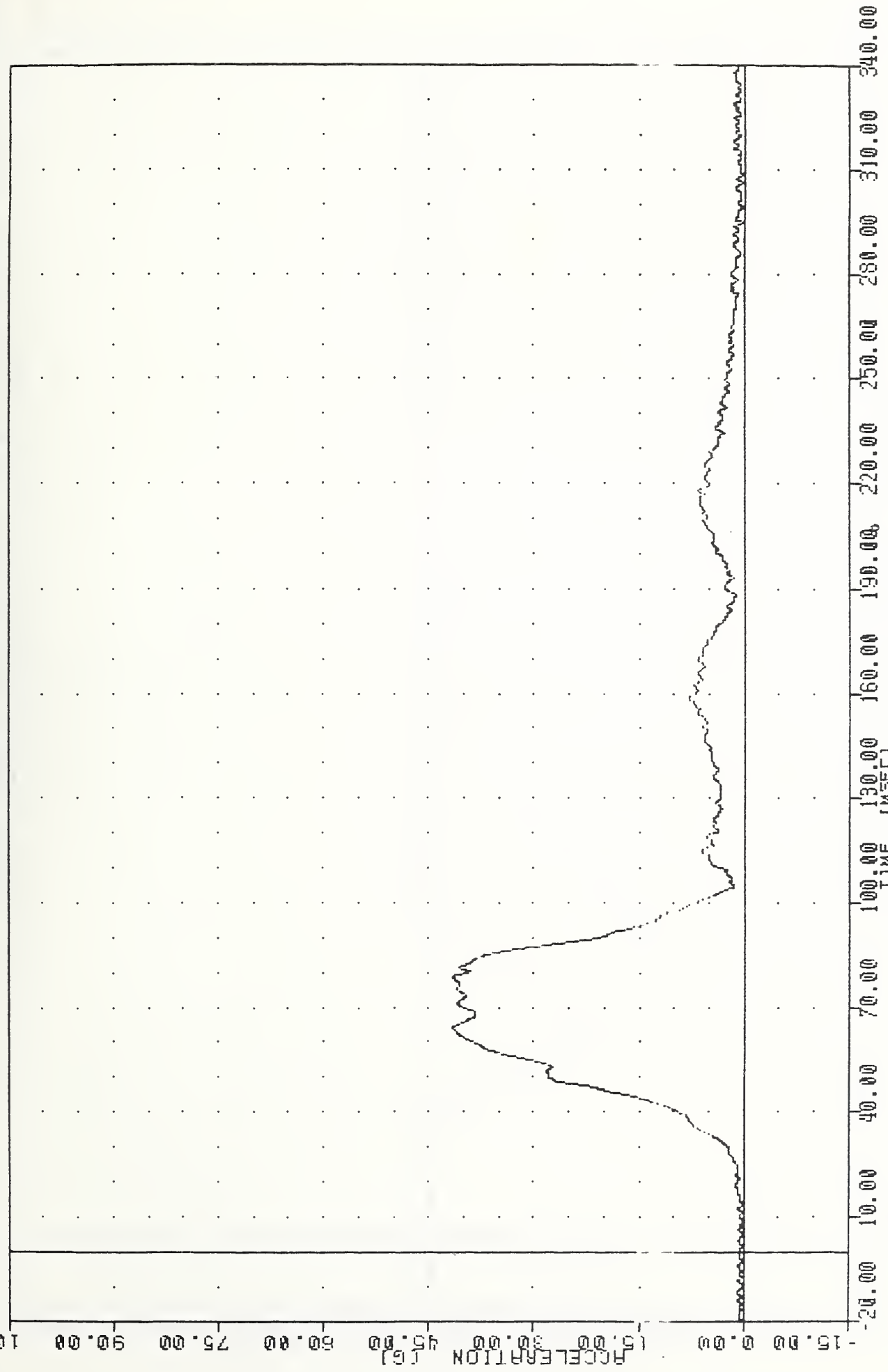
FILTER = BLPP 300/ 750/ -16  
 MIN, MAX VALUES = -4.42 8.81 0 48.63



TOYOTA CAMRY INTO FRONTAL BARRIER  
 PASSENGER CHEST Z AXIS ACCELERATION

TRC , 871103  
 208 FRONTAL CRASH TEST  
 87307  
 CSTRG2

FILTER = BLPP 300/ 750/ -16  
 MIN. MAX VALUES = 0.04e 1.50 , 41.58 e 64.13

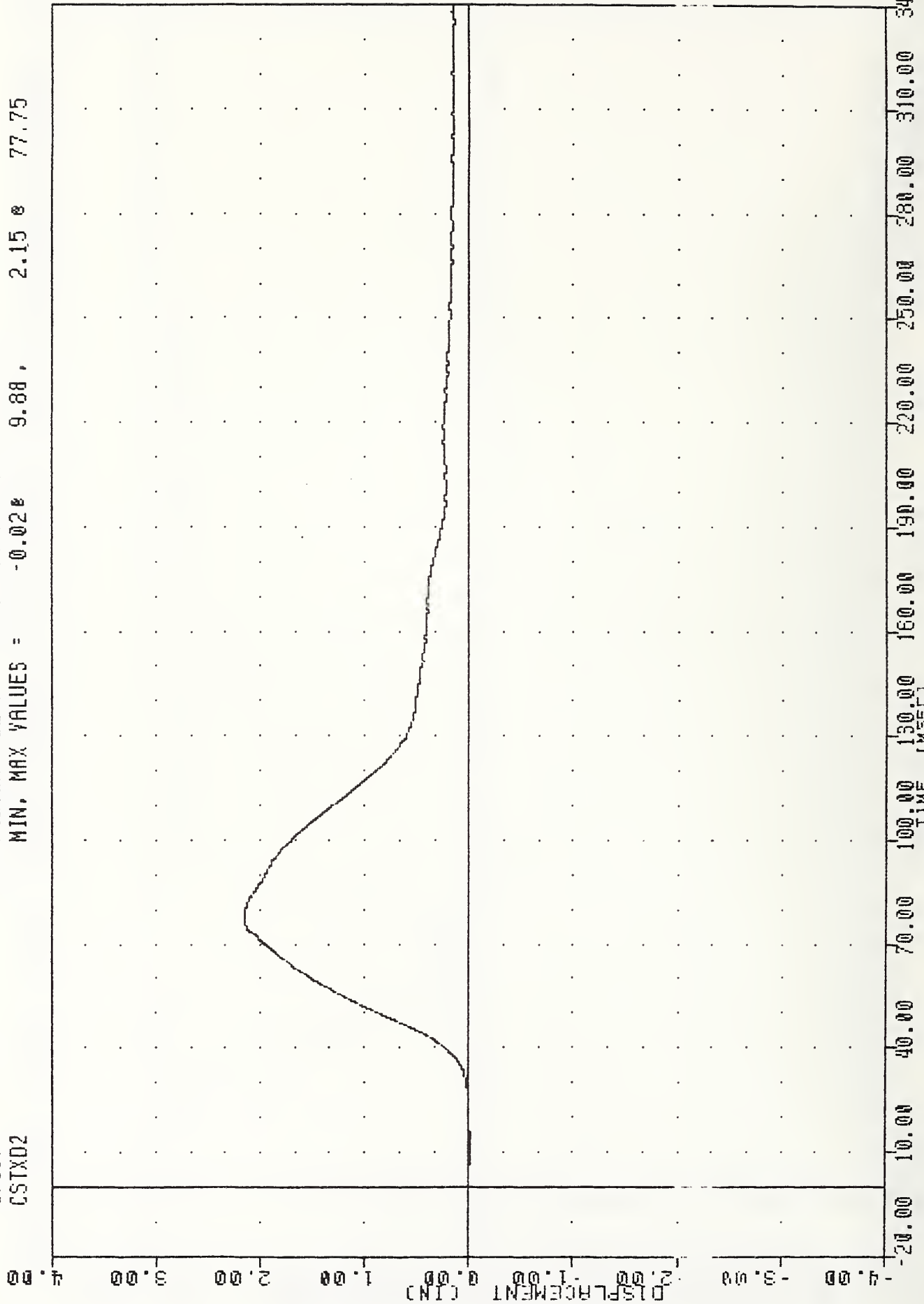


TOYOTA CAMRY INTO FRONTAL BARRIER  
 PASSENGER CHEST RESULTANT ACCELERATION



TRC , 871103  
 200 FRONTAL CRASH TEST  
 87307  
 CSTXD2

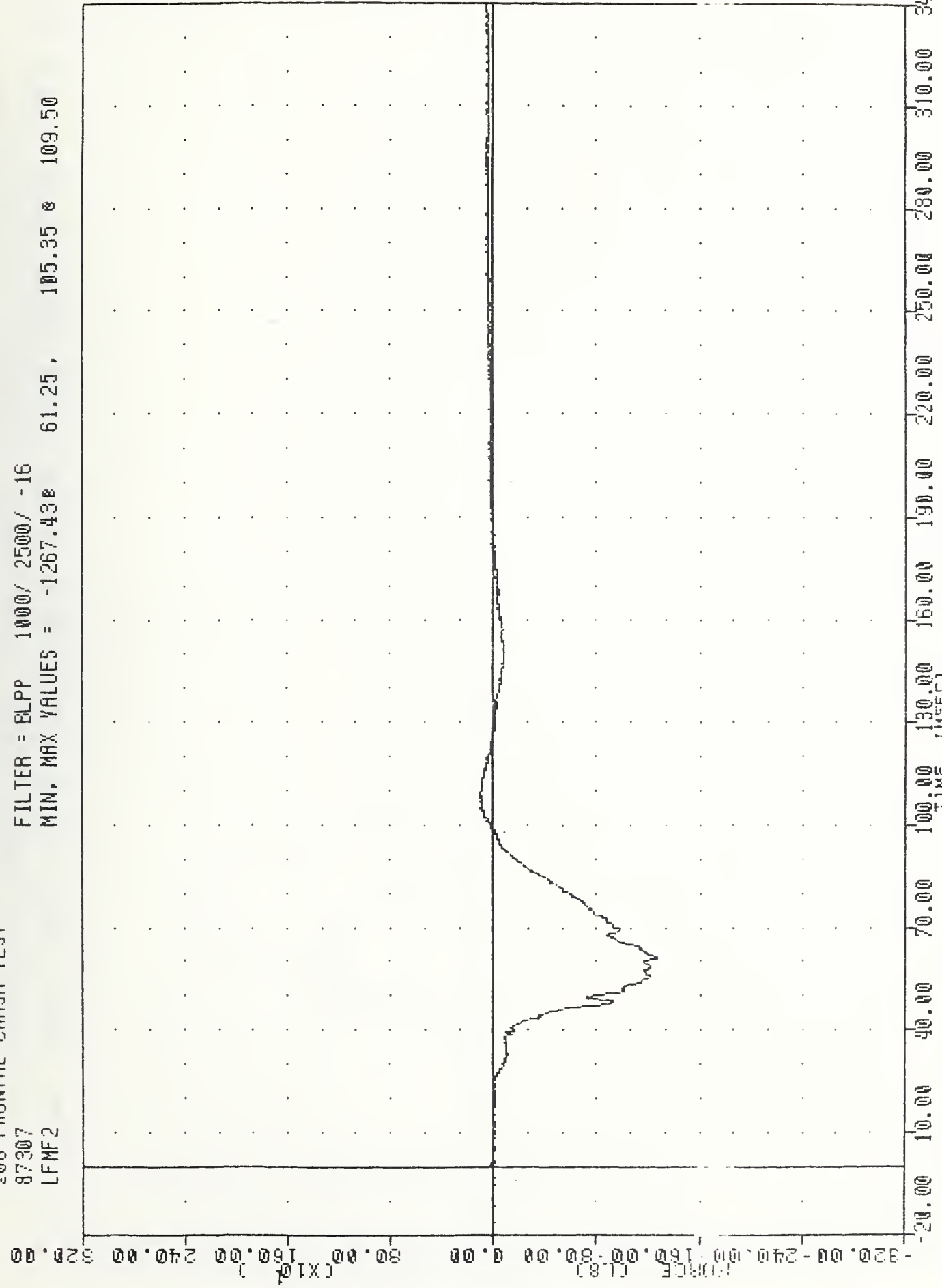
FILTER = BLPP 300/ 750/ -16  
 MIN. MAX VALUES = -0.02 9.88 , 2.15 77.75



TOYOTA CAMRY INTO FRONTAL BARRIER  
 PASSENGER CHEST DISPLACEMENT INCHES

TRC , 871103  
 200 FRONTAL CRASH TEST  
 87307  
 LFMF2

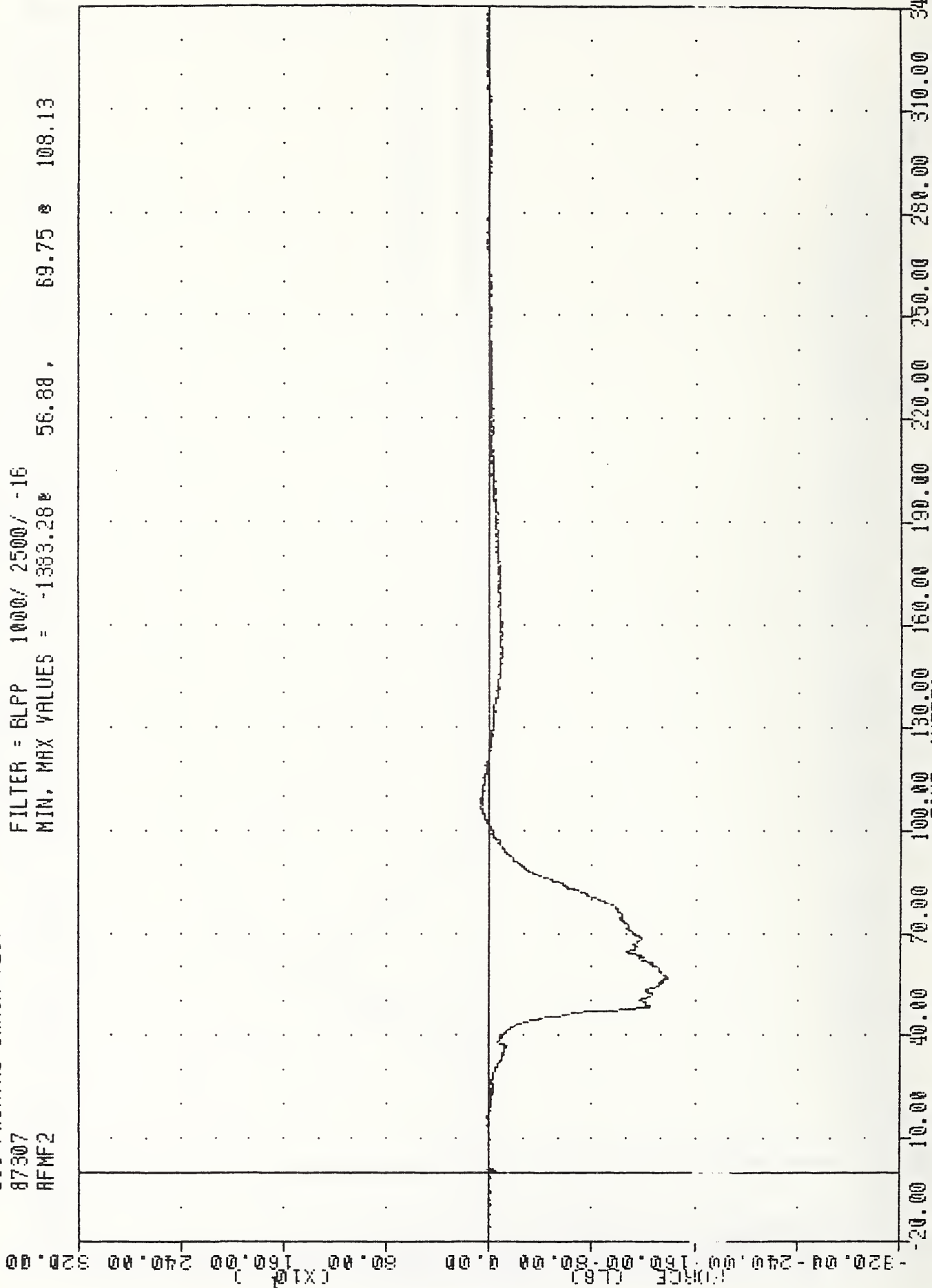
FILTER = BLPP 1000/ 2500/ -16  
 MIN, MAX VALUES = -1267.430 61.25, 105.35 & 109.50



TOYOTA CAMRY INTO FRONTAL BARRIER  
 PASSENGER LEFT FEMUR FORCE LBS

TAC , 871103  
200 FRONTAL CRASH TEST  
87307  
AFMF2

FILTER = BLPP 1000/ 2500/ -16  
MIN, MAX VALUES = -1383.28 56.88, 69.75 108.13

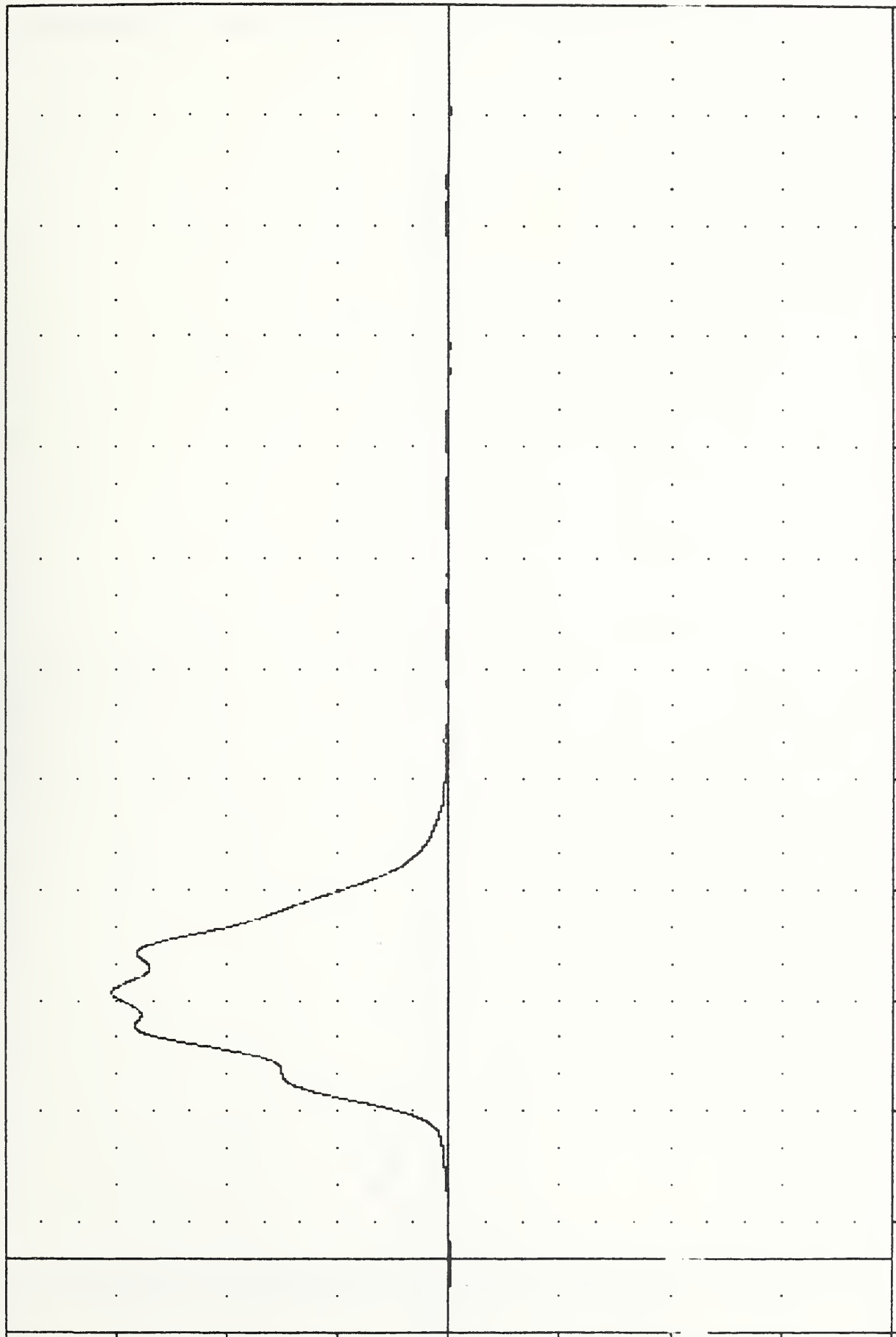


TOYOTA CAMRY INTO FRONTAL BARRIER  
PASSENGER RIGHT FEMUR FORCE LBS

TRC , 871103  
 208 FRONTAL CRASH TEST  
 87307  
 SHBF2

FILTER = BLPP 100/ 250/ -16  
 MIN, MAX VALUES = -5.63e -5.00, 1819.30 e 72.13

FORCE (LBS)  
 (X10<sup>4</sup>)



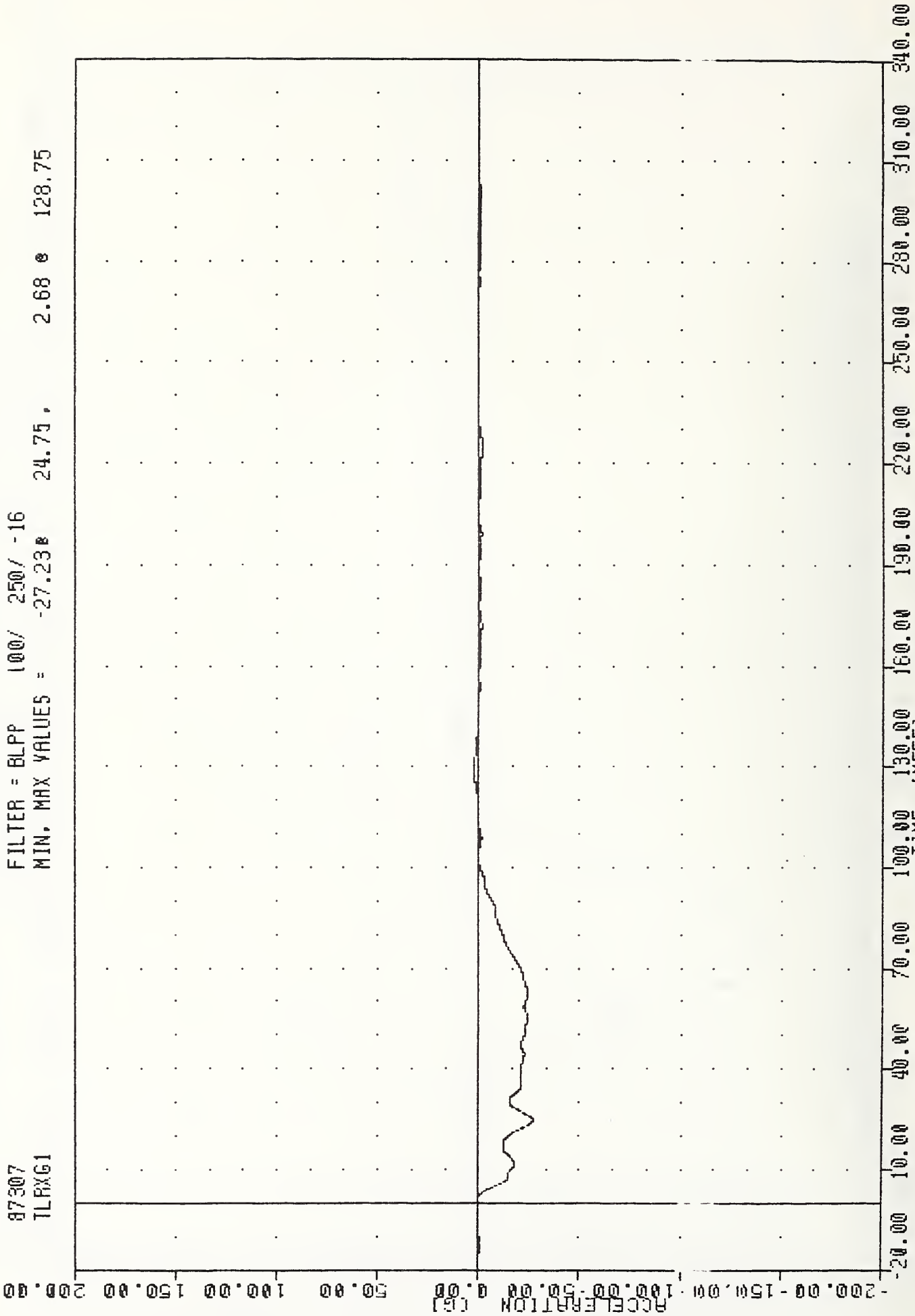
TIME (MSEC)

TOYOTA CAMRY INTO FRONTAL BARRIER  
 PASSENGER'S PASSIVE BELT INBOARD FORCE LBS



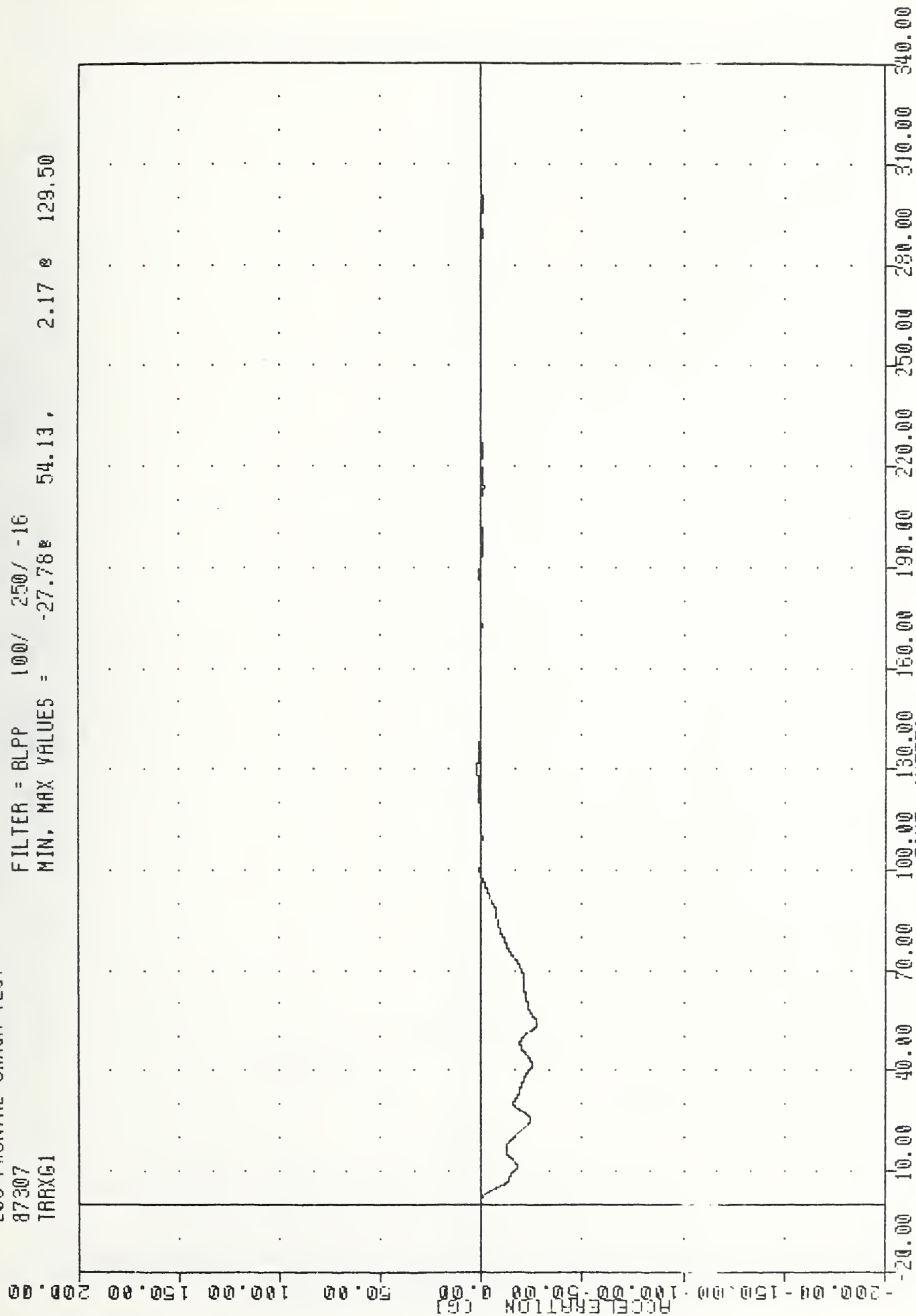
TRC , 871103  
 200 FRONTAL CRASH TEST  
 87307  
 TLRXG1

FILTER = BLPP 100/ 250/ -16  
 MIN. MAX VALUES = -27.23 24.75 , 2.68 128.75



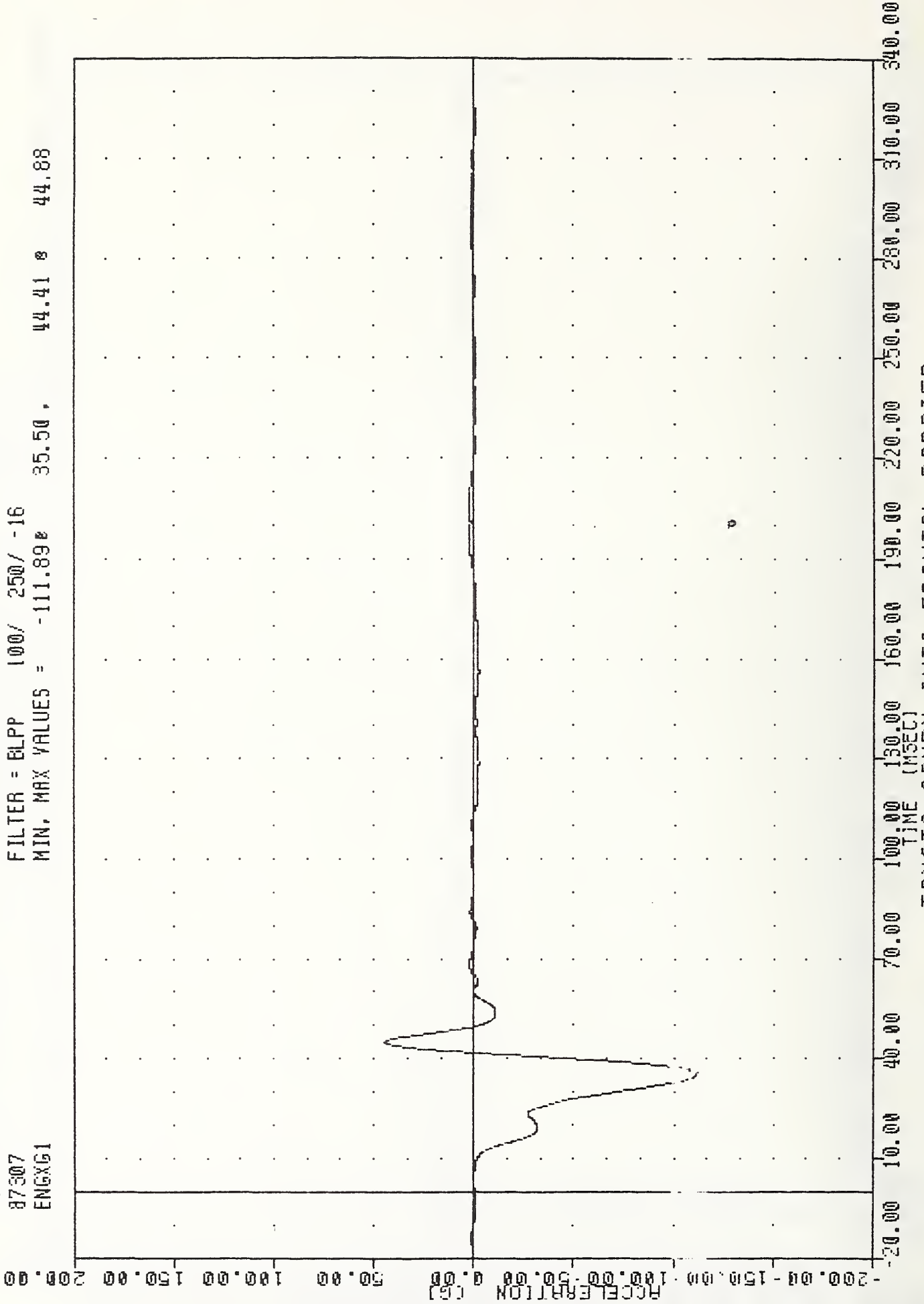
TRC , 871103  
 208 FRONTAL CRASH TEST  
 87307  
 TRRXG1

FILTER = BLPP 100/ 250/ -16  
 MIN. MAX VALUES = -27.78 54.13 , 2.17 129.50



TRC , 871103  
 200 FRONTAL CRASH TEST  
 87307  
 ENGCG1

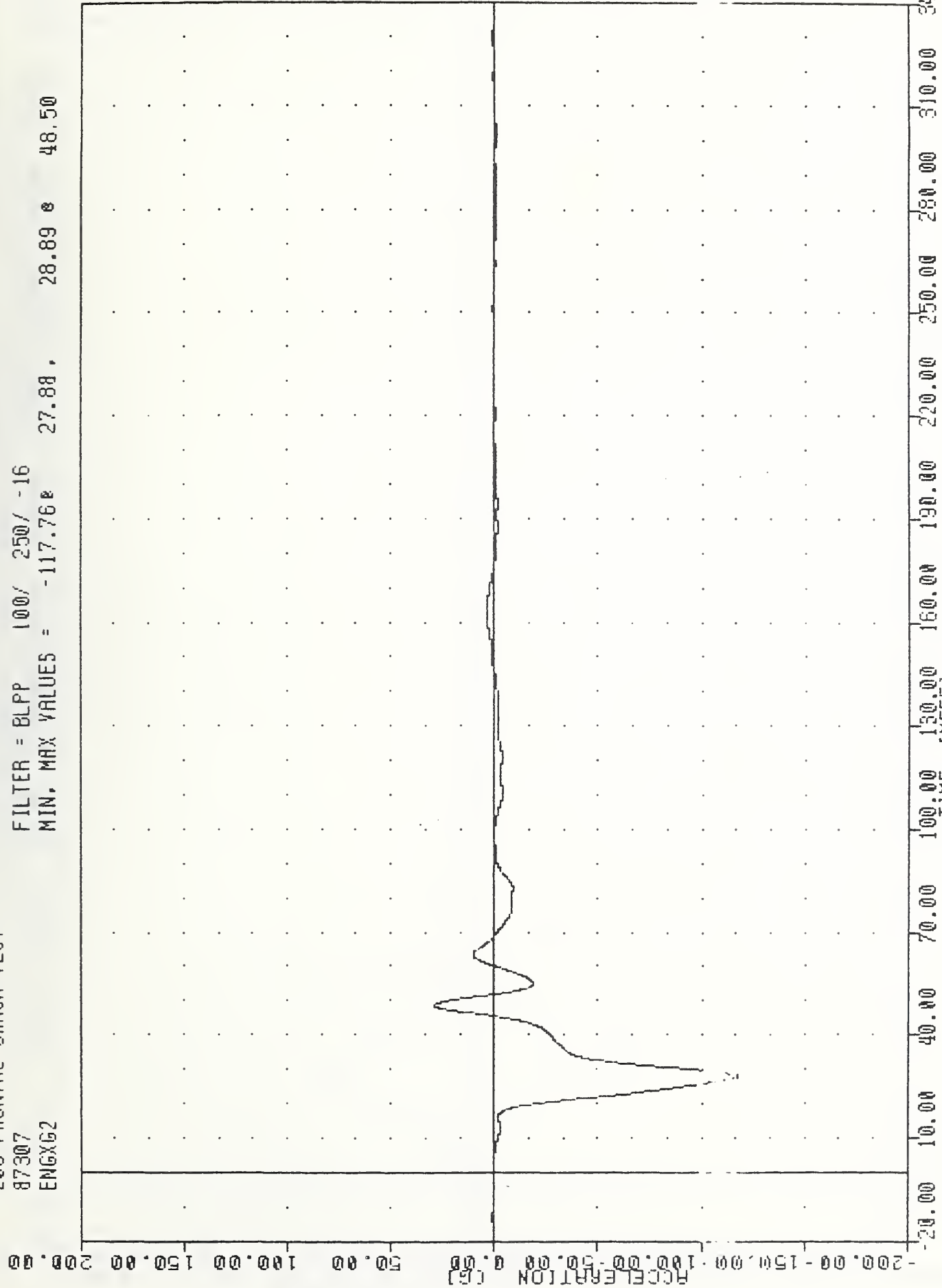
FILTER = BLPP 100/ 250/ -16  
 MIN, MAX VALUES = -111.89 35.50 , 44.41 8 44.88



TOYOTA CAMRY INTO FRONTAL BARRIER  
 ENGINE UPPER BLOCK X AXIS ACCELERATION

TRC , 871103  
 200 FRONTAL CRASH TEST  
 87307  
 ENG62

FILTER = BLPP 100/ 250/ -16  
 MIN. MAX VALUES = -117.76 27.88 28.89 48.50

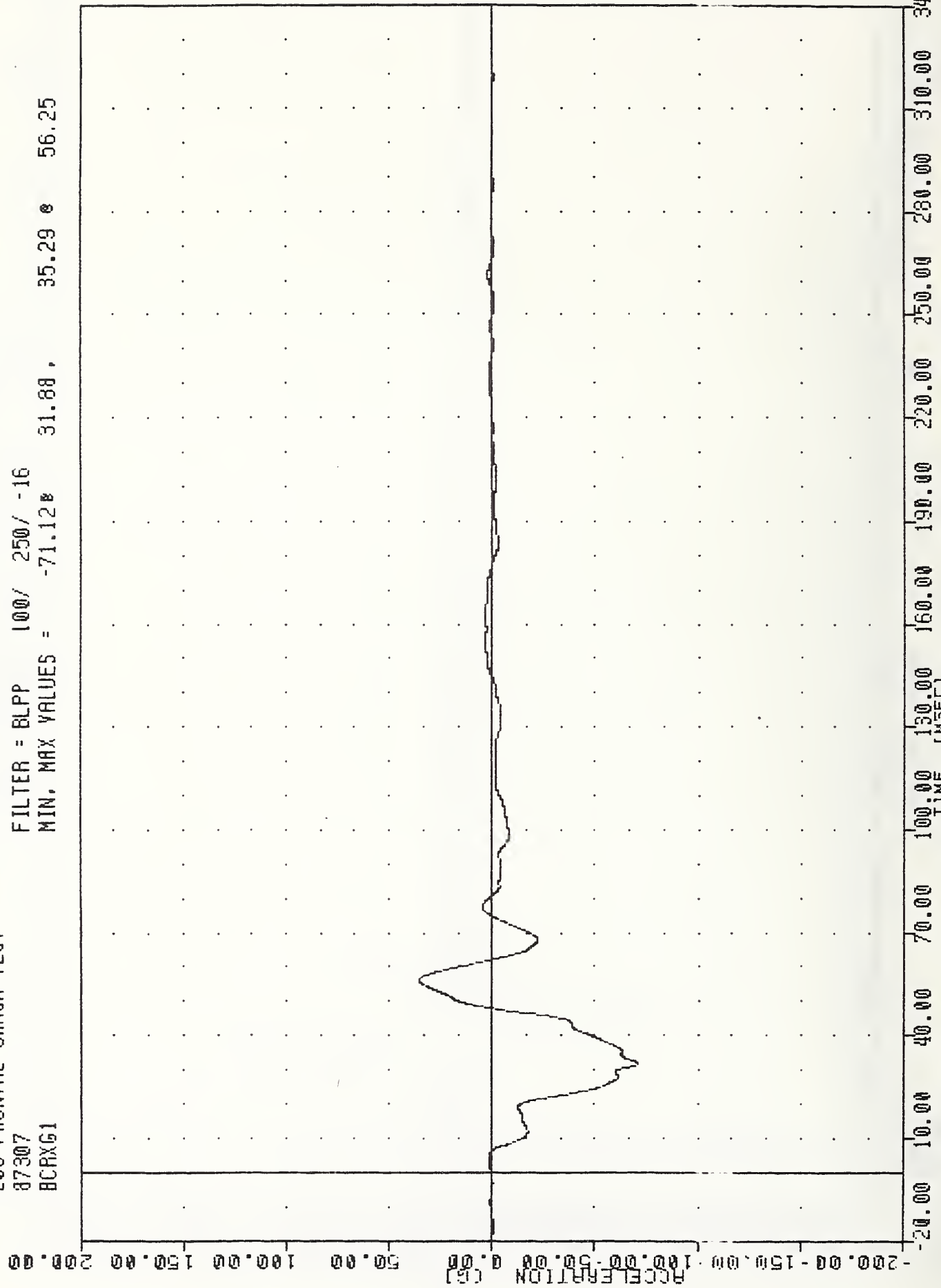


TOYOTA CAMRY INTO FRONTAL BARRIER  
 ENGINE BOTTOM X AXIS ACCELERATION



TRC , 871103  
 200 FRONTAL CRASH TEST  
 87307  
 BCRXG1

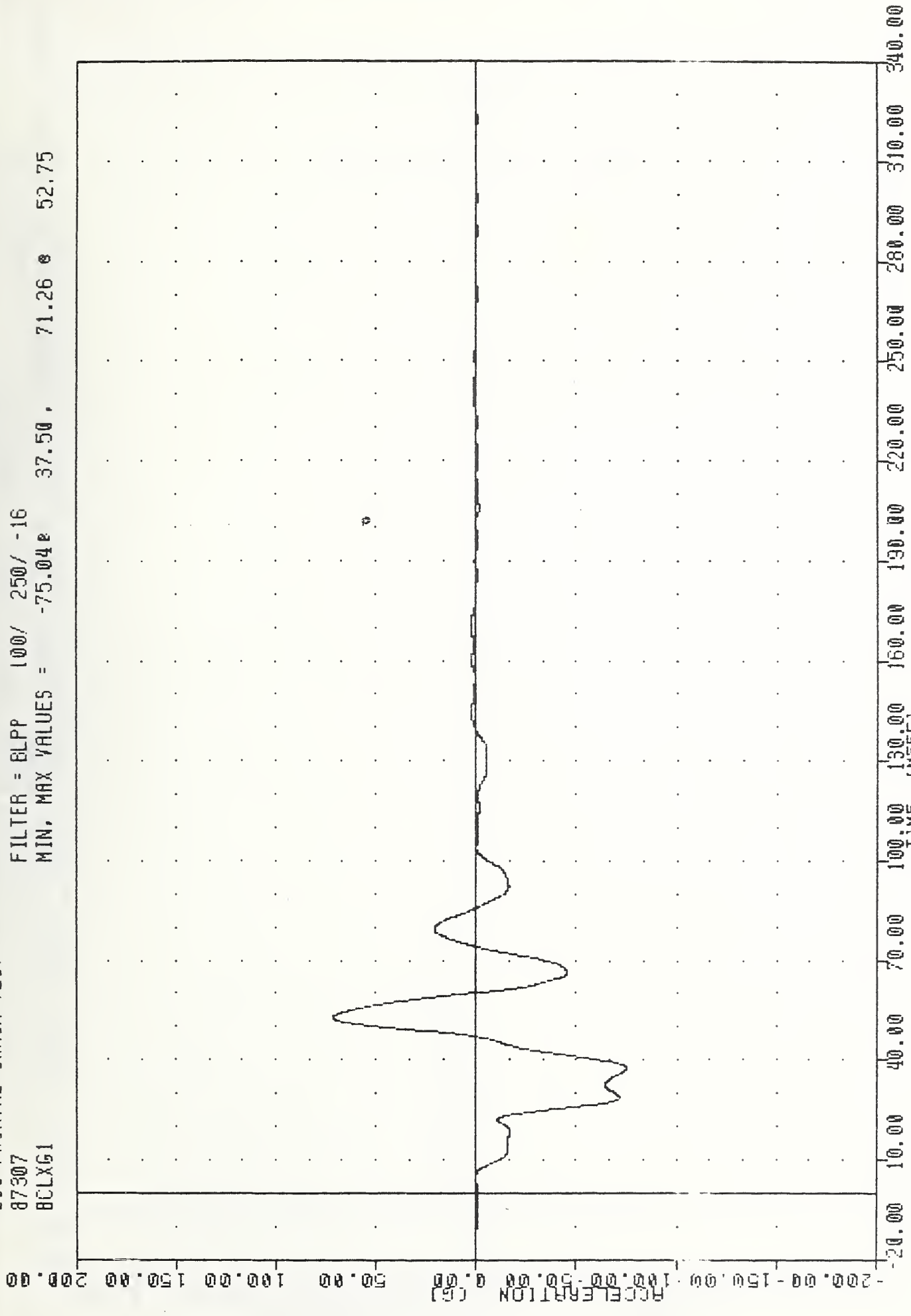
FILTER = BLPP 100/ 250/ -16  
 MIN. MAX VALUES = -71.12 31.88 , 35.29 56.25



TOYOTA CAMRY INTO FRONTAL BARRIER  
 RIGHT BRAKE CALIPER X AXIS ACCELERATION

TRC , 871103  
 208 FRONTAL CRASH TEST  
 87307  
 BCLXG1

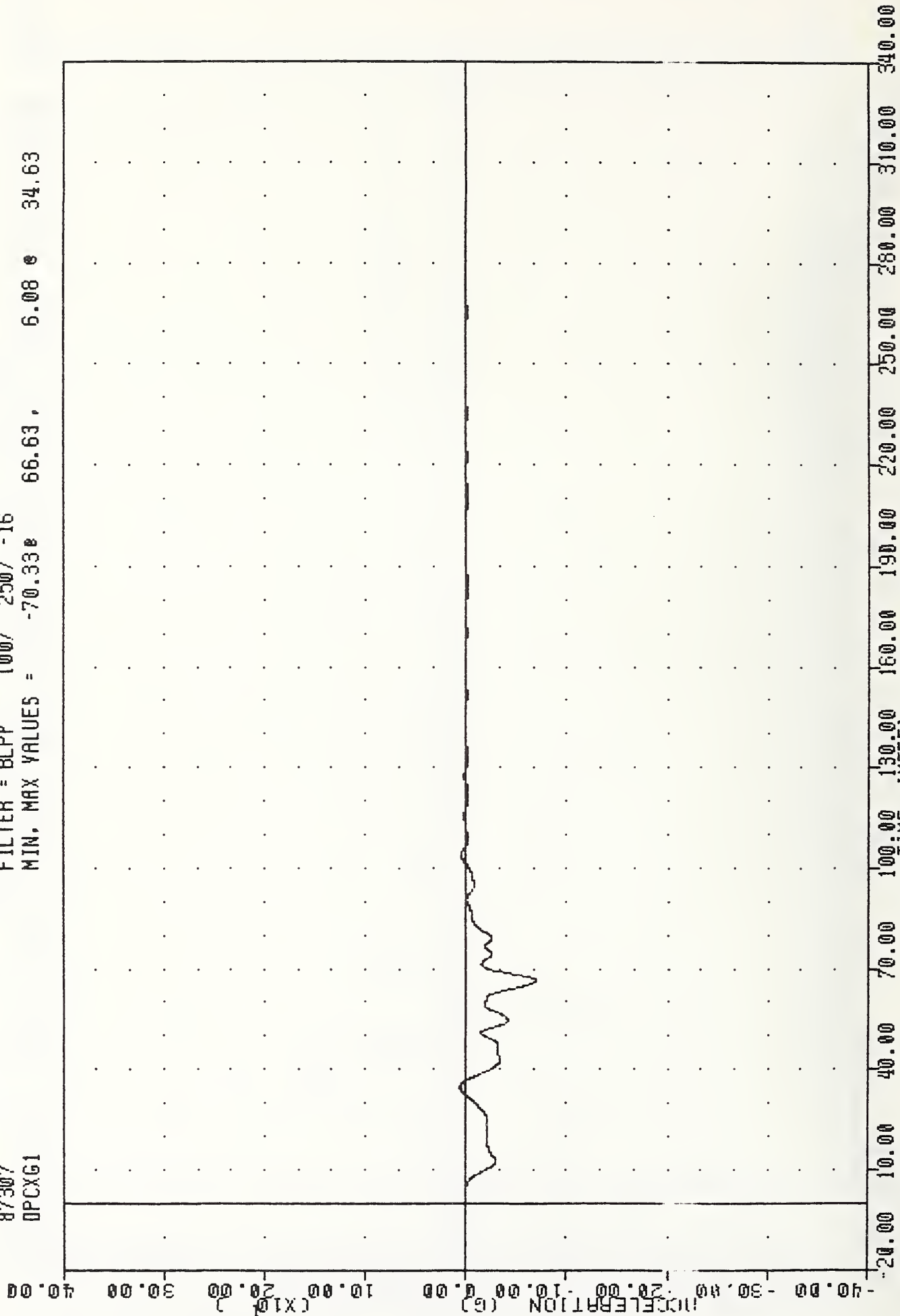
FILTER = BLPP 100/ 250/ -16  
 MIN, MAX VALUES = -75.04e 37.50, 71.26 e 52.75



TOYOTA CAMRY INTO FRONTAL BARRIER  
 LEFT BRAKE CALIPER X AXIS ACCELERATION

TRC , 871103  
 206 FRONTAL CRASH TEST  
 87307  
 OPCXG1

FILTER = BLPP 100/ 250/ -16  
 MIN, MAX VALUES = -70.33e 66.63, 6.08 e 34.63



TOYOTA CAMRY INTO FRONTAL BARRIER  
 DASH PANEL CENTER X AXIS ACCELERATION

APPENDIX C

DUMMY CERTIFICATION INFORMATION



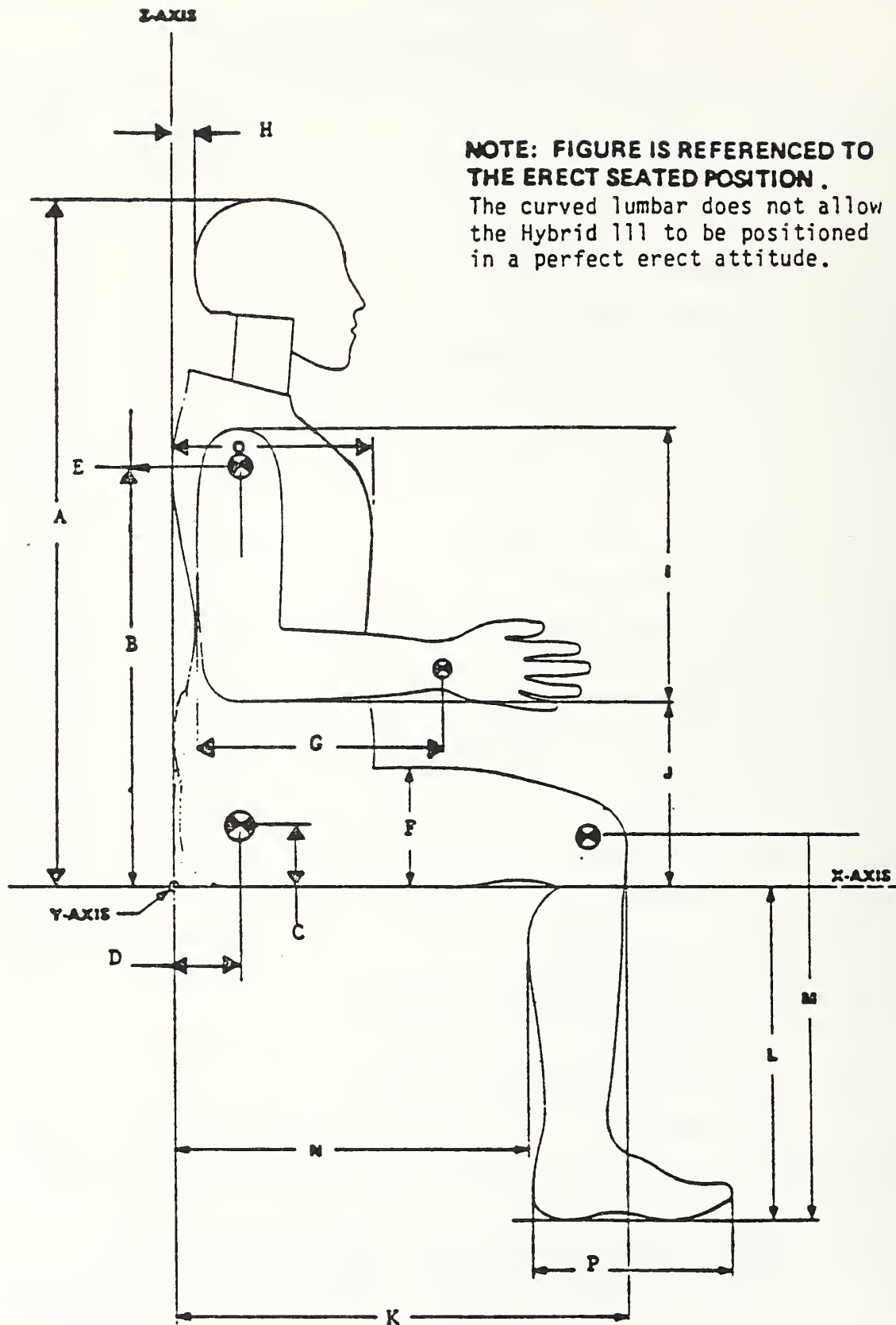
POST-TEST CALS

S/N: 45

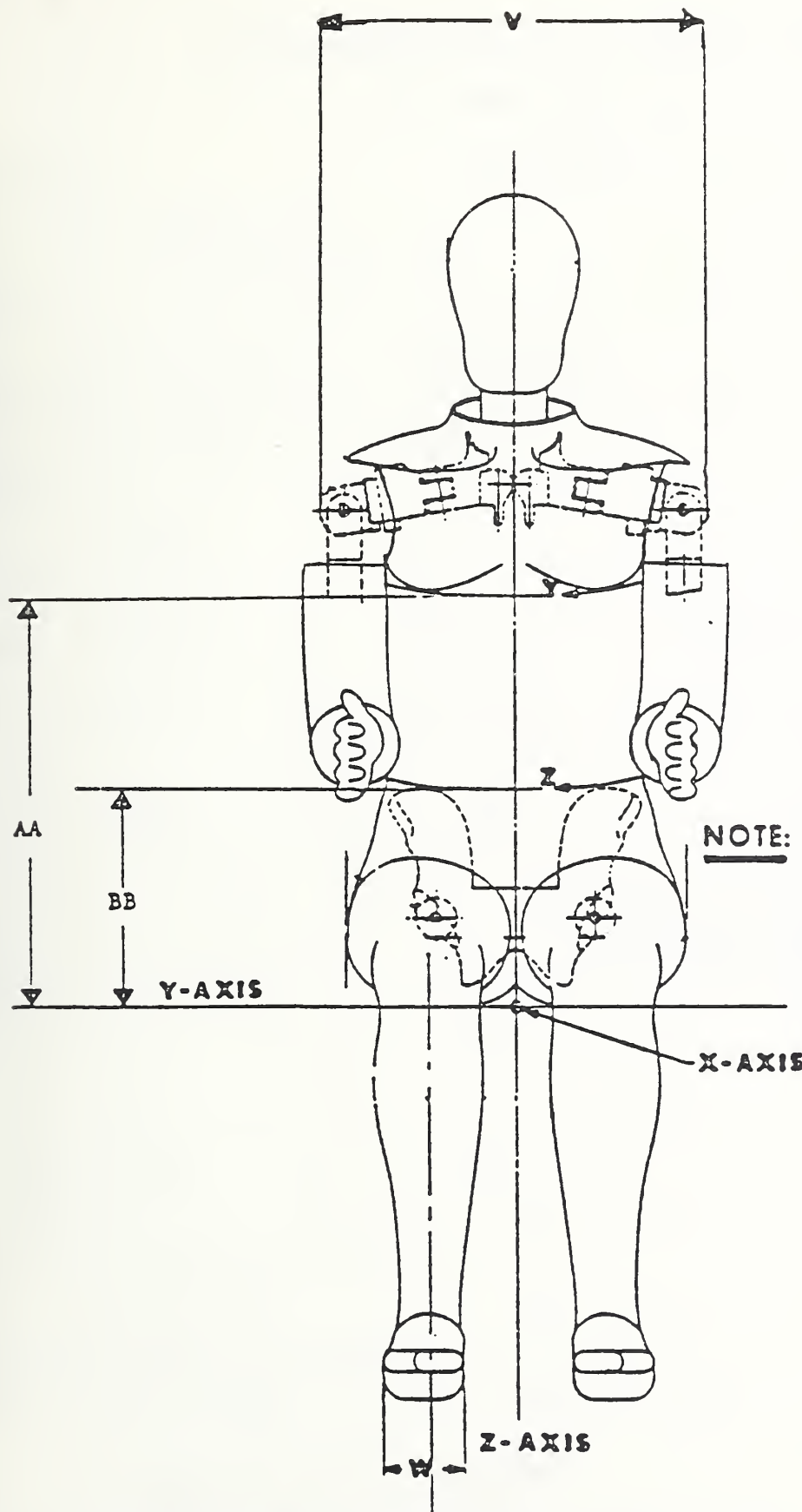
HYBRID III EXTERIOR DIMENSIONS

Dimensional Symbol	Description	Spec Dimension	Dummy Dimension SN 45
A	Sitting Height (Erect)	34.8 $\pm$ .2	<u>34.6</u>
B	Shoulder Pivot Height	20.2 $\pm$ .3	<u>19.9</u>
C	"H" Point Height	3.4 ref.	<u>3.4</u>
D	"H" Point Location from Back Line	5.4 ref.	<u>5.4</u>
E	Shoulder Pivot Location from Back Line	3.5 $\pm$ .2	<u>3.7</u>
F	Thigh Clearance	5.8 $\pm$ .3	<u>5.6</u>
G	Back of Elbow to Wrist Pivot	11.7 $\pm$ .3	<u>11.4</u>
H	Occiput to Z-Axis	1.7 $\pm$ .1	<u>1.7</u>
I	Shoulder - Elbow Length	13.3 $\pm$ .3	<u>13.2</u>
J	Elbow Rest Height	7.9 $\pm$ .4	<u>7.9</u>
K	Buttock Knee Length	23.3 $\pm$ .5	<u>22.8</u>
L	Popliteal Height	17.4 $\pm$ .5	<u>17.1</u>
M	Knee Pivot Height	19.4 $\pm$ .3	<u>19.4</u>
N	Buttock Popliteal Length	18.3 $\pm$ .5	<u>18.3</u>
O	Chest Depth	8.7 $\pm$ .3	<u>8.7</u>
P	Foot Length	10.2 $\pm$ .3	<u>10.1</u>
V	Shoulder Breadth	16.9 $\pm$ .3	<u>16.8</u>
W	Foot Breadth	3.9 $\pm$ .3	<u>3.6</u>
Y	Chest Circumference	38.8 $\pm$ .6	<u>38.9</u>
Z	Waist Circumference	33.5 $\pm$ .6	<u>34.0</u>
AA	Location for Measurement of Chest Circumference	17.0 $\pm$ .1	<u>17.0</u>
BB	Location for Measurement of Waist Circumference	9.0 $\pm$ .1	<u>9.0</u>

NOTE: The "H" point is located 1.83 inches forward and 2.57 inches down from the center of the pelvis angle reference hole.



HYBRID III Exterior Body Dimensions - Side View



**NOTE: FIGURE REFERENCED  
TO THE ERECT SEATED  
POSITION.**

The curved lumbar does  
not allow the Hybrid II  
to be positioned in a  
perfect erect attitude.

HYBRID III Exterior Body Dimensions - Front View



## TRANSPORTATION RESEARCH CENTER OF OHIO

## HEAD DROP TEST

HYBRID 111

30-OCT-87

VRTC

45026HD1

HY3 SN45 HEAD DROP CAL 26

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	70.60 DEG. F
RELATIVE HUMIDITY	10% - 70%	28.00 %
PEAK RESULTANT ACCELERATION	225 - 275 G	249.10 G
PEAK LATERAL ACCELERATION	15 G MAX	5.10 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN

*Chas. Middle*

## TRANSPORTATION RESEARCH CENTER OF OHIO

## NECK EXTENSION TEST

HYBRID III

3 AXIS NECK TRANSDUCER

30-OCT-87

VRTC

45C26NE1

HY3 SM45 CAL26 NECK EXTENSION

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	70.70 DEG. F
RELATIVE HUMIDITY	10% - 70%	33.00 %
IMPACT VELOCITY	19.50 - 20.30 FPS	19.54 FPS
PENDULUM	10 MS   17.20 - 21.20 G	19.78 G
DECELERATION	20 MS   14.00 - 19.00 G	17.03 G
	30 MS   11.00 - 16.00 G	13.45 G
MAX PENDULUM G ABOVE 30 MS	22 G MAX	14.15 G
DECELERATION-TIME CURVE		
DECAY TIME TO 5 G	38 - 46 MS	38.38 MS
D PLANE	MAX   81 - 106 DEG.	93.93 DEG.
ROTATION	TIME   72 - 82 MS	80.63 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN   -59.0/-39.0 FT.LB	-49.70 FT.LBS
	TIME   65 - 79 MS	71.50 MS
ROTATION ANGLE-TIME CURVE		
DECAY TIME TO ZERO	147 - 174 MS	167.63 MS
NEGATIVE MOMENT-TIME CURVE		
DECAY TIME TO ZERO	120 - 148 MS	142.00 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK FLEXION TEST

HYBRID III

3 AXIS NECK TRANSDUCER

30-OCT-87

VRTC

45C26NF1

HY3 SN45 CAL26 NECK FLEXION

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	70.70 DEG. F
RELATIVE HUMIDITY	10% - 70%	33.00 %
IMPACT VELOCITY	22.6 - 23.4 FPS	22.98 FPS
PENDULUM	10 MS   22.50 - 27.50 G	22.82 G
DECELERATION	20 MS   17.60 - 22.60 G	17.72 G
	30 MS   12.50 - 18.50 G	13.70 G
MAX PENDULUM G ABOVE 30 MS	29 G MAX	20.80 G
DECELERATION-TIME CURVE		
DECAY TIME TO 5 G	34 - 42 MS	41.63 MS
D PLANE	MAX   64 - 78 DEG.	73.81 DEG.
ROTATION	TIME   57 - 64 MS	63.38 MS
MOMENT ABOUT OCCIPITAL	MAX   65 - 80 FT.LBS	76.97 FT.LBS
CONDYLE	TIME   47 - 58 MS	54.63 MS
ROTATION ANGLE-TIME CURVE		
DECAY TIME TO ZERO	113 - 128 MS	125.13 MS
POSITIVE MOMENT-TIME CURVE		
DECAY TIME TO ZERO	97 - 107 MS	106.75 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN *Chas. Middel*

## TRANSPORTATION RESEARCH CENTER OF OHIO

## THORAX IMPACT TEST

HYBRID III

31-OCT-87

VRTC

45C26TH1

HY3 SN45 CAL 26 H.S.THORAX 01

-----		
	HIGH SPEED TEST	
-----		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
=====		
TEMPERATURE	69 - 72 DEG. F	71.60 DEG. F
-----		
RELATIVE HUMIDITY	10% - 70%	37.00 %
-----		
PENDULUM VELOCITY	21.6-22.4 FT/SEC	21.88 FT/SEC
-----		
MAXIMUM DEFLECTION	2.50 - 2.86 INCHES	2.88 INCHES *
-----		
MAXIMUM RESISTIVE FORCE	1080 - 1245 POUNDS	1175.8 POUNDS
-----		
INTERNAL HYSTERESIS	69% - 85%	73.4%
-----		

\*\*\* TEST DOES NOT MEET SPECIFICATIONS \*\*\*

TECHNICIAN

*Chas. Middleton*



TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBRID III

30-OCT-87

LEFT  
VRTC

KNEE  
45C26LK1

HY3 SN45 L.KNEE 11LB CAL 26

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	70.40 DEG. F
RELATIVE HUMIDITY	10% - 70%	28.00 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	6.90 FT/SEC
PEAK KNEE IMPACT FORCE	996 - 1566 LBS.	1403.84 LBS.
PROBE WEIGHT	11.0 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN

*Chas. Middle*

## TRANSPORTATION RESEARCH CENTER OF OHIO

## KNEE IMPACT TEST

HYBRID III

30-OCT-87

RIGHT  
VRTCKNEE  
45C26RK1

HY3 SN45 R.KNEE 11LB CAL 26

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	70.50 DEG. F
RELATIVE HUMIDITY	10% - 70%	28.00 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	6.90 FT/SEC
PEAK KNEE IMPACT FORCE	996 - 1566 LBS.	1180.71 LBS.
PROBE WEIGHT	11.0 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN

*Chas. Middleton*

POST-TEST CALS

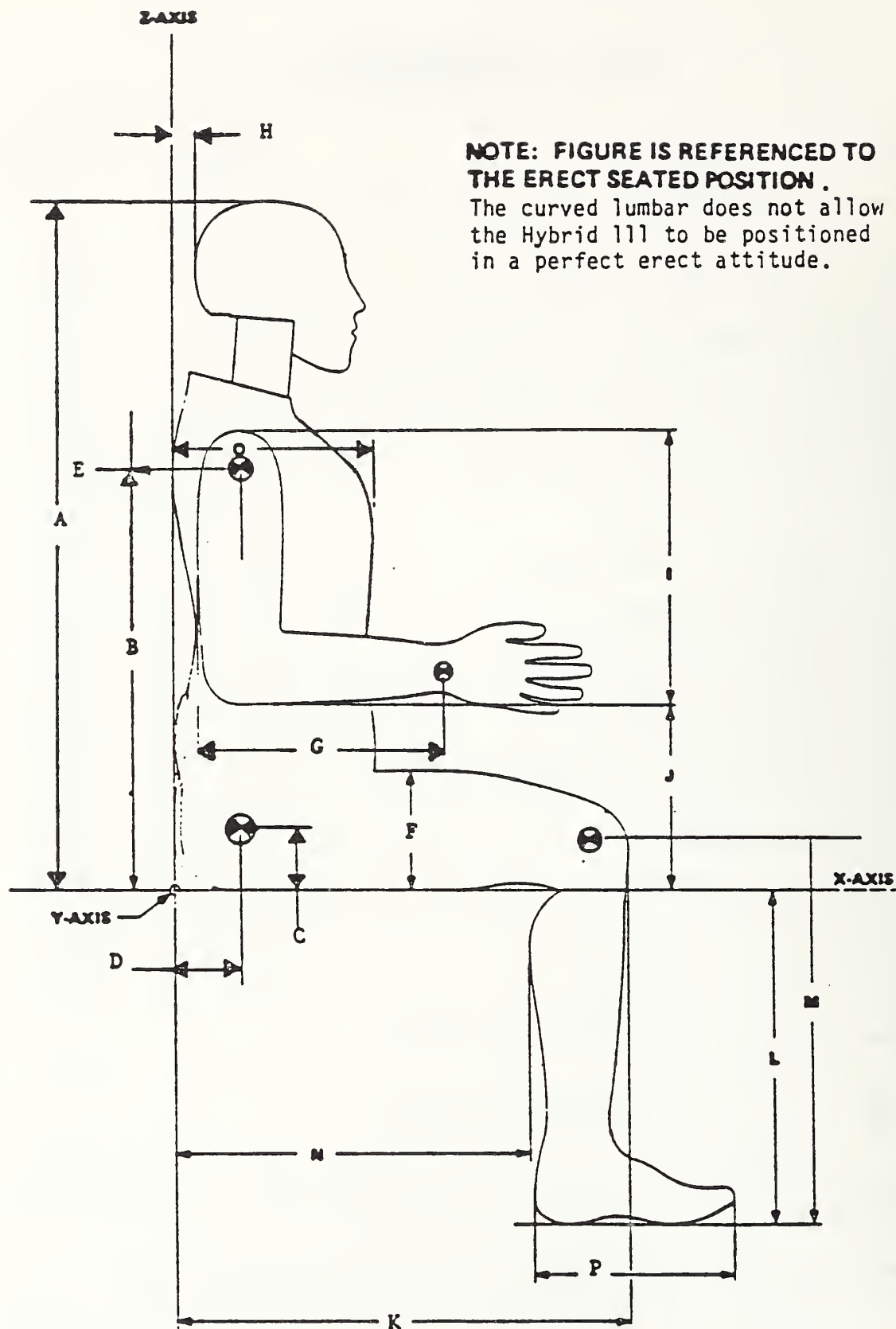
S/N: 143

## HYBRID III EXTERIOR DIMENSIONS

Dimensional Symbol	Description	Spec Dimension	Dummy Dimension SN 143
A	Sitting Height (Erect)	34.8 $\pm$ .2	<u>34.7</u>
B	Shoulder Pivot Height	20.2 $\pm$ .3	<u>19.9</u>
C	"H" Point Height	3.4 ref.	<u>3.4</u>
D	"H" Point Location from Back Line	5.4 ref.	<u>5.4</u>
E	Shoulder Pivot Location from Back Line	3.5 $\pm$ .2	<u>3.7</u>
F	Thigh Clearance	5.8 $\pm$ .3	<u>5.9</u>
G	Back of Elbow to Wrist Pivot	11.7 $\pm$ .3	<u>11.5</u>
H	Occiput to Z-Axis	1.7 $\pm$ .1	<u>1.7</u>
I	Shoulder - Elbow Length	13.3 $\pm$ .3	<u>13.3</u>
J	Elbow Rest Height	7.9 $\pm$ .4	<u>7.8</u>
K	Buttock Knee Length	23.3 $\pm$ .5	<u>23.3</u>
L	Popliteal Height	17.4 $\pm$ .5	<u>17.0</u>
M	Knee Pivot Height	19.4 $\pm$ .3	<u>19.6</u>
N	Buttock Popliteal Length	18.3 $\pm$ .5	<u>18.3</u>
O	Chest Depth	8.7 $\pm$ .3	<u>8.8</u>
P	Foot Length	10.2 $\pm$ .3	<u>10.2</u>
V	Shoulder Breadth	16.9 $\pm$ .3	<u>16.8</u>
W	Foot Breadth	3.9 $\pm$ .3	<u>3.9</u>
Y	Chest Circumference	38.8 $\pm$ .6	<u>38.5</u>
Z	Waist Circumference	33.5 $\pm$ .6	<u>33.6</u>
AA	Location for Measurement of Chest Circumference	17.0 $\pm$ .1	<u>17.0</u>
BB	Location for Measurement of Waist Circumference	9.0 $\pm$ .1	<u>9.0</u>

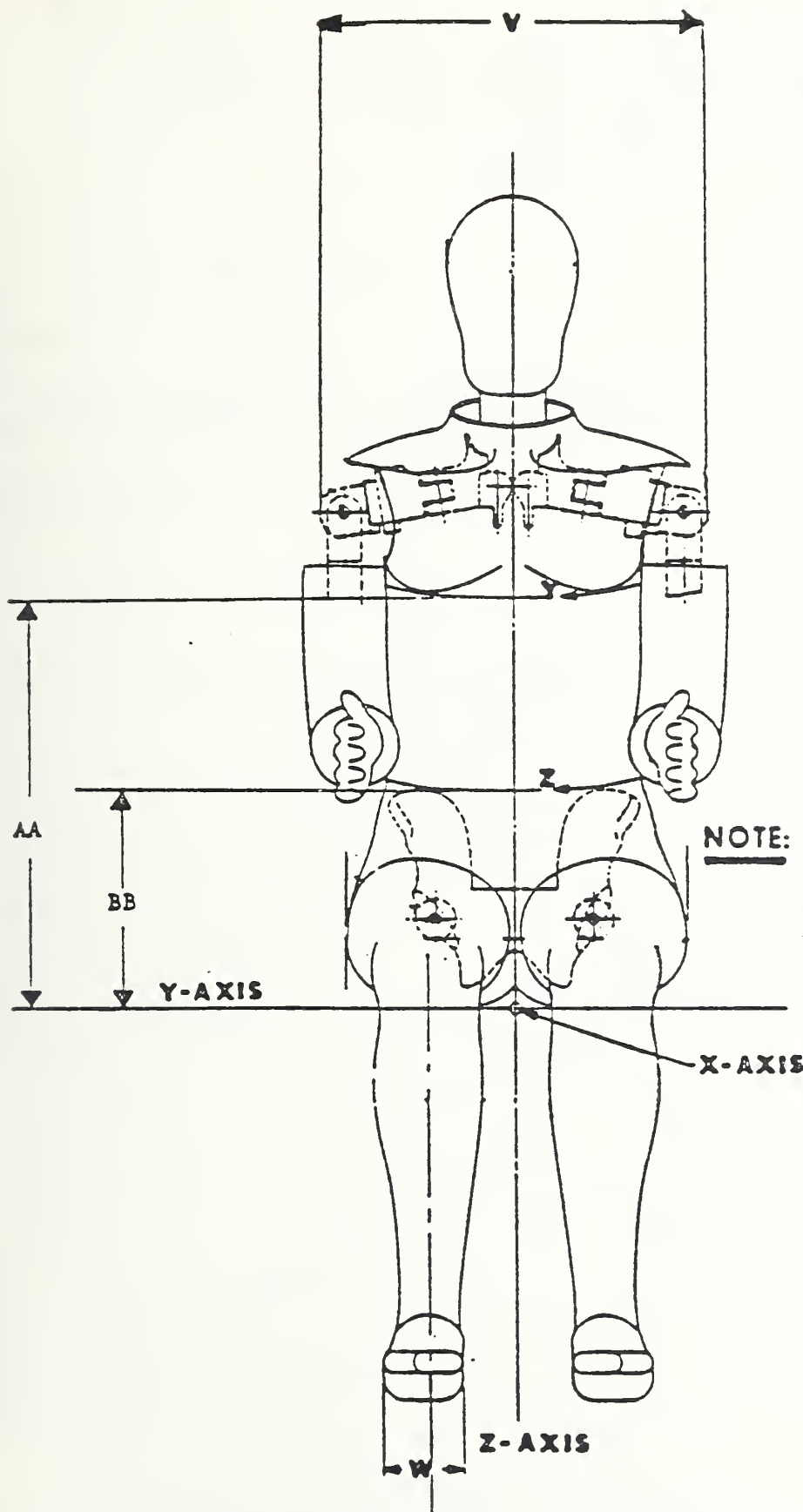
NOTE: The "H" point is located 1.83 inches forward and 2.57 inches down from the center of the pelvis angle reference hole.





**NOTE: FIGURE IS REFERENCED TO THE ERECT SEATED POSITION .**  
 The curved lumbar does not allow the Hybrid III to be positioned in a perfect erect attitude.

**HYBRID III Exterior Body Dimensions - Side View**



**NOTE: FIGURE REFERENCED  
TO THE ERECT SEATED  
POSITION .**

The curved lumbar does  
not allow the Hybrid III  
to be positioned in a  
perfect erect attitude.

HYBRID III Exterior Body Dimensions - Front View

## TRANSPORTATION RESEARCH CENTER OF OHIO

## HEAD DROP TEST

HYBRID III

30-OCT-87

VRTC

143C2HD1

HY3 SN143 HEAD DROP CAL 2

	TEST PARAMETER		SPECIFICATION
			TEST RESULTS
	TEMPERATURE		66 - 78 DEG. F
			70.60 DEG. F
	RELATIVE HUMIDITY		10% - 70%
			28.00 %
	PEAK RESULTANT ACCELERATION		225 - 275 G
			253.82 G
	PEAK LATERAL ACCELERATION		15 G MAX
			-4.01 G
	IS ACCELERATION CURVE		
	UNIMODAL?		YES
			YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN

*Chas. Middleton*

## TRANSPORTATION RESEARCH CENTER OF OHIO

## NECK EXTENSION TEST

## HYBRID III

3 AXIS NECK TRANSDUCER

02-NOV-87

URTC

143C2NE1

HY3 SN143 CAL2 NECK EXTENSION

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	71.40 DEG. F
RELATIVE HUMIDITY	10% - 70%	48.00 %
IMPACT VELOCITY	19.50 - 20.30 FPS	19.50 FPS
PENDULUM	10 MS   17.20 - 21.20 G	17.86 G
DECELERATION	20 MS   14.00 - 19.00 G	15.01 G
	30 MS   11.00 - 16.00 G	13.34 G
MAX PENDULUM G ABOVE 30 MS	22 G MAX	13.30 G
DECELERATION-TIME CURVE		
DECAY TIME TO 5 G	38 - 46 MS	40.13 MS
D PLANE	MAX   81 - 106 DEG.	97.58 DEG.
ROTATION	TIME   72 - 82 MS	74.00 MS
MOMENT ABOUT OCCIPITAL	MIN   -59.0/-39.0 FT.LB	-58.52 FT.LBS
CONDYLE	TIME   65 - 79 MS	74.38 MS
ROTATION ANGLE-TIME CURVE		
DECAY TIME TO ZERO	147 - 174 MS	166.50 MS
NEGATIVE MOMENT-TIME CURVE		
DECAY TIME TO ZERO	120 - 148 MS	148.63 MS **

\*\*\* TEST DOES NOT MEET SPECIFICATIONS \*\*\*

TECHNICIAN *Chas. Middleton*



## TRANSPORTATION RESEARCH CENTER OF OHIO

## NECK FLEXION TEST

## HYBRID III

3 AXIS NECK TRANSDUCER

31-OCT-87

VRTC

143C2NF1

HYB SN143 CALC NECK FLEXION

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	70.80 DEG. F
RELATIVE HUMIDITY	10% - 70%	36.00 %
IMPACT VELOCITY	22.6 - 23.4 FPS	22.87 FPS
PENDULUM	10 MS   22.50 - 27.50 G	26.98 G
DECELERATION	20 MS   17.60 - 22.60 G	20.72 G
	30 MS   12.50 - 18.50 G	16.02 G
MAX PENDULUM G ABOVE 30 MS	29 G MAX	15.93 G
DECELERATION-TIME CURVE		
DECAY TIME TO 5 G	34 - 42 MS	35.88 MS
D PLANE	MAX   64 - 78 DEG.	76.15 DEG.
ROTATION	TIME   57 - 64 MS	63.88 MS
MOMENT ABOUT OCCIPITAL	MAX   65 - 80 FT.LBS	76.15 FT.LBS
CONDYLE	TIME   47 - 53 MS	51.38 MS
ROTATION ANGLE-TIME CURVE		
DECAY TIME TO ZERO	113 - 128 MS	119.75 MS
POSITIVE MOMENT-TIME CURVE		
DECAY TIME TO ZERO	97 - 107 MS	104.25 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN *Chas. Middleton*

## TRANSPORTATION RESEARCH CENTER OF OHIO

## THORAX IMPACT TEST

HYBRID III

29-OCT-67

VRTC

14300TH1

HY3 54143 CAL 2 H.B. THORAX 01

	HIGH SPEED TEST	
	-----	
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	70.20 DEG. F
RELATIVE HUMIDITY	10% - 70%	36.00 %
PENDULUM VELOCITY	21.6-22.4 FT/SEC	22.01 FT/SEC
MAXIMUM DEFLECTION	2.50 - 2.86 INCHES	2.65 INCHES
MAXIMUM RESISTIVE FORCE	1080 - 1245 POUNDS	1116.6 POUNDS
INTERNAL HYSTERESIS	69% - 85%	76.4%

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN

*Chas. Middle*

## TRANSPORTATION RESEARCH CENTER OF OHIO

## KNEE IMPACT TEST

HYBRID 111

30-OCT-87

LEFT  
VRTCKNEE  
143C2LK1

HY3 SN143 L.KNEE 11LR CAL 2

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	70.50 DEG. F
RELATIVE HUMIDITY	10% - 70%	28.00 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	6.96 FT/SEC
PEAK KNEE IMPACT FORCE	996 - 1566 LBS.	1243.75 LBS.
PROBE WEIGHT	11.0 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN

*Chas. Middleton*

## TRANSPORTATION RESEARCH CENTER OF OHIO

## KNEE IMPACT TEST

HYBRID III

30-OCT-87

RIGHT KNEE  
VRTC 14302RK1

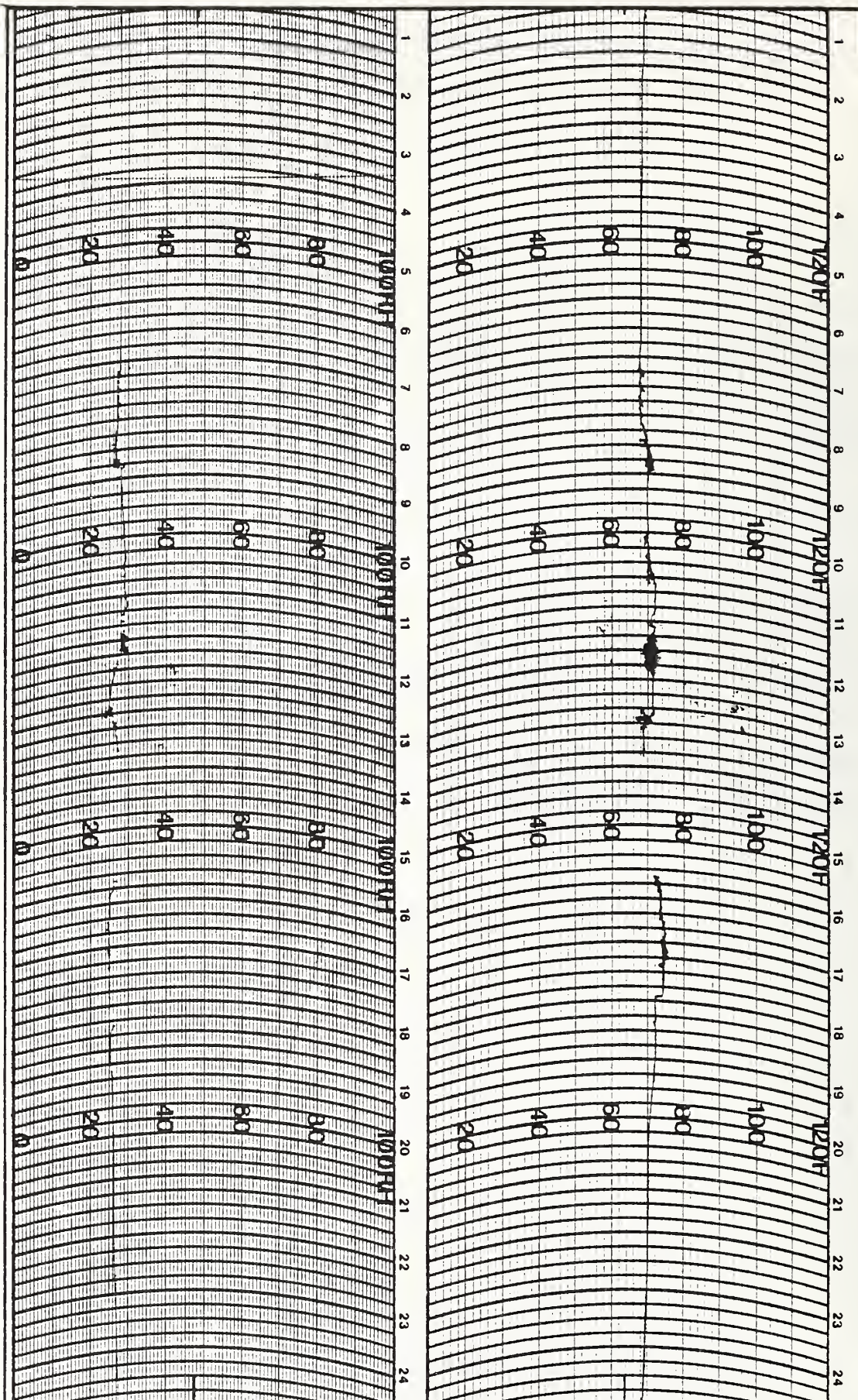
HY3 SN143 R.KNEE 11LB CAL C

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	70.50 DEG. F
RELATIVE HUMIDITY	10% - 70%	28.00 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	6.95 FT/SEC
PEAK KNEE IMPACT FORCE	996 - 1566 LBS.	1271.51 LBS.
PROBE WEIGHT	11.0 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton





WEATHER MEASURE  
P.O. BOX 41257  
SACRAMENTO, CA. 95841  
PHONE (916) 481-7565

HYGROTHERMOGRAPH  
1 DAY

CHART # C311 D HF  
PART # 699123

STATION SUBARU XT DATE ON 10/12/67 DATE OFF \_\_\_\_\_

TL 242 .S26

Sankey, J.

Vehicle bar  
testing on

Form DOT F 1720  
FORMERLY FORM DO

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